MGH News

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Strengthening the Body's Defenses to Battle Cancer

The spotlight on the war against cancer has shifted.

Even as efforts accelerate to conquer the nation's second leading killer with drugs (chemotherapy), radiation medicine, and surgery, interest in possible benefits from still another branch of medicine has intensified.

In the last few years, specialists in immunology—the science dealing with the body's natural defenses against disease—have studied substances which may have a profound ability to counteract tumors.

The most recently publicized is a chemical called interleukin 2 (IL-2) that is produced in tiny amounts as part of a person's immune system. Researchers believe that when the immune defenses break down, the giving of more IL-2 may help the body work harder to heal itself.

Various potential anticancer techniques incorporating IL-2 are being tested at the National Cancer Institute (NCI) in Bethesda, Md., and, with both federal and private funding, at other medical centers. The MGH has developed an alternative use of IL-2 that in *early* stages has looked even more promising.

Dr. Thomas P. Stossel, Chief of the Hematology–Oncology Unit at the MGH, cautioned that "there is a long distance between great ideas and reality. We may be seeing an advance against cancer, but I think we're going to need a lot more basic research before we really know."

In recent years, interferon, a protein produced by the body to fight viral infections, was thought to be the long-sought "magic bullet" against cancer.

"Preliminary results were encouraging," Dr. Stossel said, "but it turned out that, with respect to cancer, interferon was only beneficial against hairy cell

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Normal Aging Often Affects Mental Ability

The most common complaint heard among people of advanced years is that their "memory isn't as good as it used to be."

Unfortunately, all too often this admission automatically leads others to label the individual as senile.

People whose minds are healthy may very well experience increased forgetfulness. Studies verify that, in general, those who are older tend to remember new information less well than their younger counterparts.

But what do older people mean when they complain of inability to remember? Marilyn S. Albert, Ph.D., an MGH neuropsychologist, believes that it is due to the impact of a number of cognitive changes, not only memory, but that older persons can do a great deal to adapt to the changes and minimize them.

In a federally financed study of people ranging in age from 30 to 80, Dr. Albert found that, even though the participants had been carefully screened to exclude anyone with a discernible disorder, cognitive changes took place among those who were older. Some changes occurred early in the lifespan (40–60), others later (70 and beyond).

Employing CT (computed tomography) scans, EEGs (electroencephalograms which record the electrical activity of the brain), and cognitive testing, Dr. Albert and her colleagues saw parallels between changes in cognitive function and in the brain's electrical activity and structure.

"We assume the major reason that mental functions are changing," she said, "is because the brain is changing."

What triggers these alterations in people who appear healthy remains a mystery, especially because there is such variation in older people. The brains of some 70-year-olds show little change with age. Some in their 70s can remember things as well as people in their 30s.

Dr. Albert is one of 14 specialists in various scientific endeavors who have banded together under a MacArthur Foundation grant to try to learn what enables some people to age so successfully. The researchers, from institutions throughout the nation, meet several times a year and are conducting a multidisciplinary research program. The MacArthur

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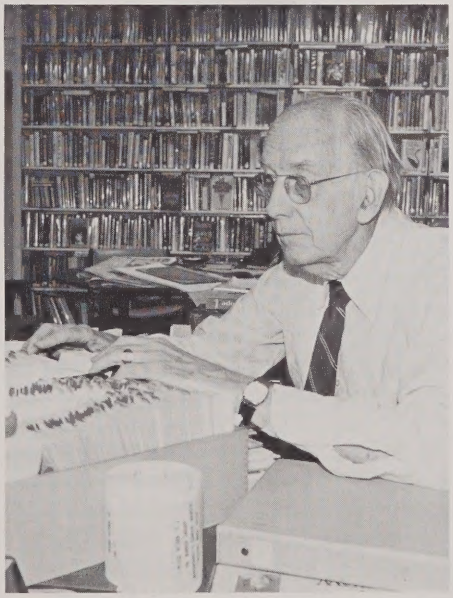
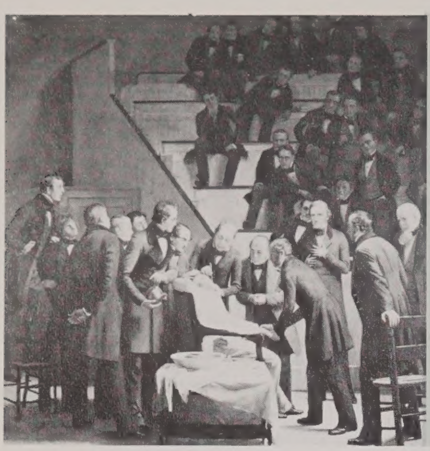


John Barry of Quincy keeps active and alert by volunteering three days a week at the MGH. In this photo, he helps out in the Warren Library.



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EDITORIAL:

Reporting Early Research Results

One of the dilemmas of medical writing involves reporting results of early research. The scientist needs to report these to his colleagues so that they can learn about the latest findings. By keeping up with early research, the investigators often get ideas for studies of their own. This speeds the development of new applications for patient care.

The problem comes from the lay public learning of early results. Until about 30 years ago, the scientist could publish in a medical journal and not be concerned about laymen learning of the report. As reporters began to specialize in medical writing, that luxury disappeared. A technical article written today in a publication such as the *New England Journal of Medicine* is about as secret as the CBS-TV evening news. The public knows about the project before physicians and researchers even receive the *New England Journal.*

Why is it so bad if the public learns of early findings? The problem is that it is exquisitely difficult to report them in such a way as to inform the public without creating a demand impossible to fulfill. Until doctors prove that the new treatment works, it cannot legally (and arguably morally) be provided for more than a few handsful of patients. Yet every patient with a serious disease understandably wants instant access to the "breakthrough."

Does that mean that the news media should be proscribed from writing about early findings? Not in a democracy. Should the researcher be prohibited from reporting incomplete or early results? Not without delaying the application of new diagnostic tools and treatments.

Nowhere is this scenario so vivid as with diseases like cancer and AIDS. Newspaper, radio, and television accounts whip patients and their immediate family into a frenzy. The most difficult thing for a physician to do is to tell a dying patient that the latest "breakthrough" is neither a breakthrough nor available. And no matter how carefully the medical journalist has written "preliminary results," "too early to know if it will be successful," "cannot tell yet about long-term side effects," "not yet ready for use," and a dozen other warnings, hysteria may still result.

So what is the solution? Skilled, conservative public relations practitioners can help bridge the gap. By working closely with the scientist, they can determine what appears to be the best way to provide the perspective needed by the medical writer to present important new information in a meaningful but cautious way. This usually works much better than for a frantic reporter, no matter how skillful, talking 90 minutes before deadline to an available physician who knows little about the study. Even with the combination of an articulate scientist, a concerned public relations practitioner, and a skilled medical writer, the result will never be perfect. But what is?

Fighting Cancer

(Continued from Page 1)

leukemia [a rare form of leukemia]. The major kinds of interferon used against the major cancers were totally ineffective.

"Optimism may well be justified, but in an atmosphere so charged with emotion, such as with cancer, optimism may prove premature and lead to disappointment."

What has made it possible to employ substances like IL-2 and interferons in major studies is the breakthrough in molecular biology which now makes it possible to produce these agents in significant amounts.

A year ago, an NCI team, headed by Dr. Steven A. Rosenberg, reported encouraging results from an experimental cancer treatment. It involved taking immune cells from the bloodstream of a patient, strengthening them with IL-2, and then giving the fortified cells back to the individual. Dr. Rosenberg wrote in the *New England Journal of Medicine* that the mixture, which he termed Lymphokine Activated Killer cells (LAKS), shrank tumors by more than 50 percent in 21 of 55 patients.

A follow-up report in the *Journal of the American Medical Association* of December 12, 1986, however, showed the somewhat longer-term results were less positive than originally stated.

In addition, the treatment has serious problems. So much IL-2 had to be used that severe side effects, such as excessive fluid retention, occurred.

Two MGH investigators, Drs. Richard L. Kradin of the Pulmonary and Immunopathology Units, and James T. Kurnick, of the Immunopathology Unit, actually had reported one month earlier than the original Rosenberg *New England Journal* article on their own human trials. They used a different technique than the Rosenberg team. They obtained activated T-lymphocytes (a form of white blood cell) from a patient's own tumor (instead of the bloodstream) and used them with IL-2 to fight advanced lung cancer.

Their report that they had measured a reduction in tumor size in some patients led to a $1.2 million grant from the NCI for three years of further study.

Dr. Kradin stated:

"We have seen from our studies and from Dr. Rosenberg's work with mice that tumor-associated lymphocytes are 50

Photographs: Pages 1, 3, 4, 5 (upper left), 8, Myron Daniels; p. 5 (lower right), Chris Maynard; pp. 6, 7, Thomas Croke

Drs. Richard Kradin, left, and James Kurnick in the Immunopathology Laboratory

or more times more active than peripheral blood cells at killing tumors."

Drs. Kradin and Kurnick hope to enhance the effectiveness of their stimulated lymphocytes by simultaneously giving their patients a continuous infusion of IL-2 over a 21-day period.

The IL-2 is being given in relatively low doses to determine the level at which the treatment is effective, yet produces the fewest complications.

One of the advantages of the early MGH human studies is that they caused less severe adverse side effects than the Rosenberg human trials. Reduction in tumors has already been obtained without severe side effects.

Another anticancer study at the MGH is being pursued by Dr. Herbert C. Hoover, Jr., a cancer surgeon. Since training at the MGH, he has been working for several years—at Johns Hopkins, at the State University of New York at Stony Brook, and now at the MGH—to develop a human tumor vaccine.

The effort involves obtaining 10 million tumor cells from a patient and mixing them with an equivalent number of cells of BCG, a tuberculous organism that has nonspecific immune stimulating effects. The mixture is then injected into the patient on two occasions a week apart. A week after that, a third vaccination consists of irradiated tumor cells alone. The irradiation is given to make sure the tumor will not grow out again.

"We've had encouraging results in colon cancer where we have most of our experience," Dr. Hoover said. "Among 60-odd patients who had surgery alone or surgery plus the vaccine, we have shown half as many recurrences among the treated patients as in the nontreated control group, and less than a third as many deaths among the treated as among the controls.

Dr. Hoover presently serves as chairman of a group representing 10 major institutions which hopes to repeat his colon study among as many as 500 patients during the next few years.

"This is just one step toward an immunologic approach that may be effective," the MGH specialist said. "The vaccine in itself is not necessarily the answer, but it seems to be leading us down some important pathways.

"We've been able to use lymphocytes from our patients who had the vaccine, for example, to produce monoclonal antibodies to colon cancer and now have Food and Drug Administration approval to conduct human studies with two of these target-specific antibodies. We think that is going to advance our ability to diagnose the spread of colon cancer.

"Our hope is that these monoclonals may also be used to deliver chemotherapy, cell toxins, and high-energy radioisotopes for treatment."

Studies are moving forward in another area to evaluate an assay employing monoclonal antibodies to detect primary liver cell cancer in its earliest, most treatable stages. Until now, the death toll from the disease has hovered near 100 percent because the tumor went undiscovered until it had grown too large to treat.

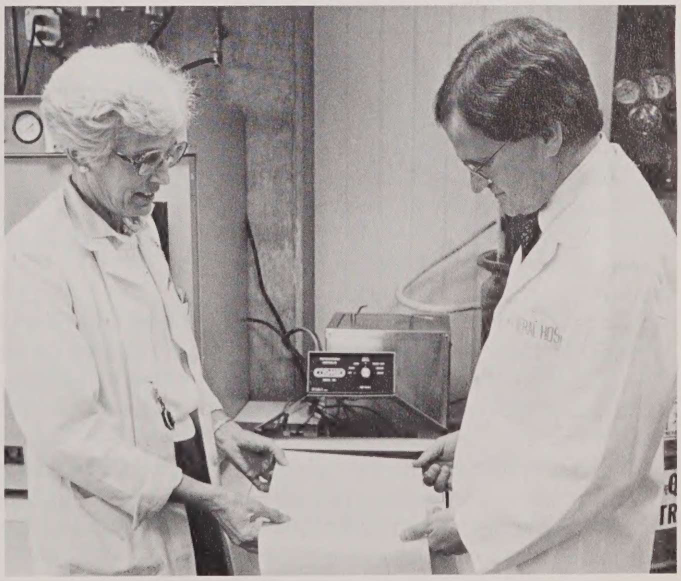
Dr. Jack R. Wands of the MGH Gastrointestinal Unit said the assay, which he helped to develop, looks for a blood substance, alpha-fetoprotein (AFP), which is present in about 70 percent of patients with primary liver cell cancer.

Hepatitis-B viral infections create the setting for such cancer. Between 250- and 300-million people worldwide carry this virus. Studies in the Far East indicate that up to 20 percent of the populations of mainland China and Taiwan are chronic carriers. The rate hovers around 10 percent in Japan and Korea and from 5 to 7 percent in the Middle East.

Only .1 percent of the United States population bears the virus. However, in the past dozen years, the rate of primary liver cell cancer has tripled in California. Using the new assay to screen 2,000 chronic carriers of the hepatitis-B virus each six months, Dr. Wands' group has focused on California.

Once an elevated AFP level is noted, the test is repeated in a month's time. If the AFP is still high, search begins for a tumor. Data on the study are still being gathered. ■

Dr. Herbert Hoover, Jr., and Research Fellow Jane Brandhorst, RN, check the freezing of cancer vaccine cells at a controlled rate. The technique, employing liquid nitrogen, preserves the cells indefinitely.



Dr. Marilyn Albert, right, observes closely as a patient takes a delayed recognition span test.

Memory Loss Minor Among Normal Aged

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Foundation has provided $7,500,000 for five years to support the work.

Memory difficulties among healthy older folks differ substantially from the kind of forgetfulness associated with senility.

Suppose a normally aging person was told a story by a neighbor about a mutual friend and later was asked, "Remember what I told you a couple of days ago about Mary?" The person may say, "No," but after a couple of clues quickly add, "Oh, yes. Now I recall." The senile person will not remember, even with a host of clues.

"We do older people a disservice by pretending that there are no substantive changes in mental function as they age," Dr. Albert said, "but the forgetfulness in healthy people is not overwhelming. Although significant statistically, the memory changes do not prevent these people from functioning normally."

If a person knows that he tends to be forgetful on occasion and realizes that this is not something to be upset about, he might ask himself, "Well, what can I do to get around it?"

Writing things down more could be one answer. If the individual parked an automobile in a lot and later could not locate it, thinking back about the day's events . . . where he went, what he did . . . might bring back the memory of where the car was left.

Although young people can generally remember new information better than the elderly, so-called primary memory does not decline even when people are in their 80s. This would involve things such as remembering a phone number. Trying to exceed a seven-digit number becomes more difficult as one ages.

Knowledge put to use over a long time is normally very well retained until the person becomes quite aged.

An elderly person who can instruct a younger one on how to repair a broken hot water heater, for instance, is reaching back into a lifetime's experience.

Similarly, if a retiree's Social Security check fails to arrive in the mail, he would probably know what to do because of similar past experiences.

Take an accomplished elderly chess player. He may have difficulty remembering moves made in a game but may compensate with other strategies developed over the years.

Despite mental changes, people aging normally can often compensate for episodes of forgetfulness.

Inability to name objects or people is often attributed incorrectly to memory loss.

"When we test naming ability in the laboratory with pictures of objects that are thoroughly familiar," Dr. Albert said, "older people know the uses for the objects, but they have much more trouble than younger people in producing the correct names. This is probably not a memory problem but a language problem, an inability, if you will, to home in on the right word."

A variety of tricks have been devised to improve naming ability. There are books and short courses to teach these techniques.

Divided attention is a common problem among the elderly. Anyone who works in an office knows that several things can go on at once. While the older person engages in a project, the phone may ring. Someone may knock at the door. A co-worker may ask for advice.

The older person may be perfectly capable of doing a task well, but chances are that with interruptions the performance will deteriorate. The worker should realize where the blame lies: divided attention. Attempts should be made whenever possible to minimize distractions.

In discussing intellectual performance and behavioral changes as people get older, Dr. Albert, who is also Assistant Professor of Psychiatry and Neurology at Harvard Medical School, cited these other important factors:

As people age, their response time slows, although most can still perform accurately. The delay does not really affect one's daily ability to function.

In today's fast-paced society, however, particularly in high-technology occupations, older people often have a difficult time competing with younger peers in keeping abreast of technological changes.

Then, there is the impact of disease on older people. As they age, a wide variety of disorders can adversely affect their intellectual function while sparing younger men and women.

"Some diseases cause more disruption than others," Dr. Albert declared. "We know, for instance, that a vitamin B-12 deficiency and a malfunctioning thyroid can both cause loss of memory. And a person suffering from congestive heart failure might lack sufficient oxygen to the brain, thus causing cognitive disturbances.

"Drugs taken in excessive amounts or in wrong combinations can also disturb intellectual capabilities."

Notwithstanding the unwelcome consequences that it can impose, forgetfulness may have a positive aspect. Being able to put out of the mind things that no longer have any significance can enable one to concentrate on what is yet to come.

And perhaps the best is yet to come. ■

Increasing Regulations Put Pressure on Physicians

"We seem to be living in an age of suspicion," said Dr. Claude E. Welch. "Everyone views everyone else with some alarm. It's a wave of disbelief that affects the banker, the lawyer, the accountant, and even the doctor."

Physicians feel pressure today on all sides. Regulations governing medical care to patients and reimbursements to doctors impose so much paper work on the care givers that they sometimes cannot devote as much time as they would like to their patients.

"Many things can slip through the cracks as a result," said Dr. Welch, an internationally known Senior Surgeon at the MGH.

"In addition to physical ills, many patients, particularly the older ones, often have social problems to discuss with the doctor if he can just take the time to listen. When such problems are cleared up, some of the medical difficulties may vanish at the same time."

Dr. Welch regrets the trend toward mandates for second opinions. "There's really been a great deal of questioning as to whether second opinions do any good," he said. "I think that in the long run our individual judgment would not only be cheaper for the patients but also probably much more productive for them."

By law, doctors in Massachusetts must accept what third party payers, such as the government and insurance companies, offer as full payment for medical care. Patients cannot be charged for the difference in a bill. The Bay State is the only state in the country with this law.

"Prior to this requirement," Dr. Welch said, "doctors in Massachusetts led colleagues in almost every other state in accepting assignments [such as Medicare payments], particularly in surgery." He termed the denial of so-called balanced billing "wrong in principle."

Dr. Philip C. Amrein, an MGH cancer specialist, stated that physicians' fees have gone up over the years but contended that, unlike public perception, the rise has merely kept pace with the cost of living.

He attributed the high cost of medical care, in large part, to the greater number of treatments patients now receive for a disease, the fact that they live longer, and the tremendous cost of new treatments and drug products. Cancer treatments, in particular, he said, are very expensive.

Dr. Amrein cited as examples the use of two drugs. One is truly effective against many types of cancers, but one day of treatment may cost $600 just for the drug. The other medication is essentially just a vitamin antidote for methotrexate, long used against cancer. Methotrexate achieves its cancer-killing effect in the first 24 hours and then must be turned off to avoid toxicity to healthy cells. A one-and-a-half-day supply of the antidote costs about $120, often more than what the methotrexate costs.

Dr. Amrein predicted that fewer young people will choose to go into the medical profession, particularly academic medicine, largely due to the prospects for a highly regulated future and the high costs of medical education, often involving a need to pay back loans of tens of thousands of dollars.

At the same time, he said, patients have very high expectations about what the medical profession "should be able to do." They become suspicious and angry when physicians try to explain the low probability of success of many treatments. He said physicians, nevertheless, must continue to communicate the limitations of current therapies or else suffer greater problems later from the disappointed patients.

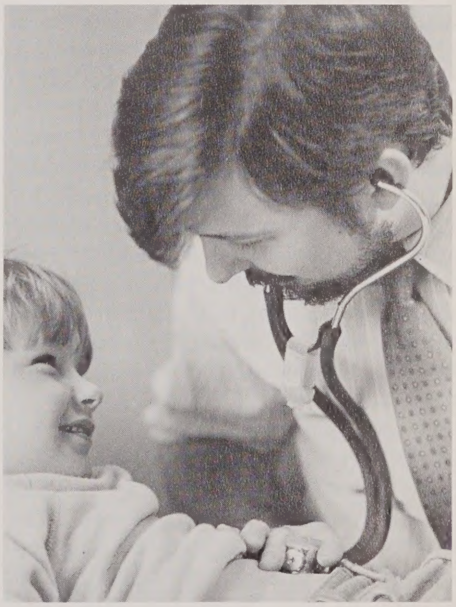
After consultations with patients, Dr. Frederick W. Ackroyd, a surgeon at the MGH for some 25 years, routinely writes letters to them, and to their primary care physician, explaining in detail why he recommended or did not recommend a particular surgical procedure.

"Informed consent requires that patients truly understand the nature of a proposed operation, what the likely benefits and downside risks are, and whether other options are available," Dr. Ackroyd said. "The letters help to avoid any misunderstandings."

He admitted that being outspokenly candid can be difficult for doctors at times because patients may decline a procedure which the physicians feel is essential for restoration of good health. "If, however, what we are doing is right," he said, "we can usually make it sound reasonable to the patient."

The MGH surgeon complained about skyrocketing costs for malpractice insurance. "If doctors in a community are expected to come up with premiums as high as $100,000 a year, which is being asked of some doctors in Florida, those costs will have to be passed on to the consumer," he said. "Otherwise, the doctors won't be able to survive because they won't be able to buy the insurance."

Dr. Ackroyd devotes considerable time to ambulatory care surgery. This increasingly popular and cost-effective innovation in medical care enables a patient to come to the hospital, undergo a surgical treatment, and go home the same day.



"I'm totally committed to this," Dr. Ackroyd said, but he cautioned, "It's not for everybody. Some elderly patients have a very hard time managing at home."

He criticized government policies

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Psychiatrist Helps To Rally the New England Patriots

The 1985 National Football League season was still young, but the hapless New England Patriots already seemed destined for another dismal year.

The team had lost four exhibition games and three of six regular season contests. One of the three victories was a squeaker past Buffalo, the poorest team in the league. Coming up: the New York Jets, one of the league's powerhouses.

Despair spread among the Patriots as 1985 began to look like a repeat of so many other poor campaigns in the team's 25-year history.

But suddenly fate took a 180-degree turn. New England played superbly against the Jets, beating them, and then won 10 of the next 12 games. The Patriots captured the American Conference Championship (the first team in history to win three playoff games on the road) and earned the right to play in the Super Bowl.

The Patriots' Tony Collins clears the way for teammate Craig James in a game with Buffalo.

What was the catalyst that converted New England into a winning club? The players themselves provided an answer. Following an important win, NFL tradition calls for presentation of the game ball to an outstanding player or coach who made the major contribution to the outcome. After defeating the Jets, the Patriots presented two game balls, one to

Physicians

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which permit denial of hospitalization benefits for some people who have very painful illnesses or complicated post-operative courses and live alone.

"The government says that we spend too much money on health care, but I think we don't spend enough," said Dr. Ackroyd, whose practice includes running a surgical clinic at the MGH's Chelsea Memorial Health Care Center. He frequently joins Chelsea internists in house calls to see patients who may need surgery but are unable to visit the clinic for an evaluation.

A new term has cropped up in health care. Under some programs of third party payers, primary care doctors have become known as "the gatekeepers." Patients see them first, and the primary care, or family, doctor decides whether a specialist is needed. Most specialists oppose this policy, claiming that patients should have free choice of doctors.

Dr. Allan H. Goroll, an MGH internist and Director of Undergraduate Education in the hospital's medical clinics, believes that the greatest concern of patients is that their physician does not really know them.

"As medicine has gotten more technically complicated, physicians, I think, have tended to focus more on the patient's disease and have had less time to deal with the patient as a person," he said. "Actually, the individual's feelings and perspectives are central to the therapeutic effort.

"Medicine has got to get back to basics, to being patient-centered rather than disease-centered. Having somebody who knows you well, whom you can call at any time of the day or night, and who can make a decision quickly and competently is essential to good care."

Dr. Goroll has conducted a study which showed that many patients who come in for routine visits ask for specific tests. The more educated the patient, the more likely the person is to have a test in mind.

This is a difficult issue, the doctor said. Much of the cost containment effort in medicine is aimed at avoiding unnecessary tests, but if the doctor refuses to order a test the patient may feel that cost avoidance – not the patient's welfare – is the care giver's main concern.

"This points up the need for close communication between the doctor and the patient," Dr. Goroll said. "We have to be sure that in any kind of system we devise for the payment of health care, we don't do anything that puts barriers between them."

Despite their complaints about the directions medicine is taking, the four physicians interviewed would not advise their own children against a medical career.

Dr. Welch's illustrious career, which included positions of leadership in many medical organizations, interested one of his two sons in becoming a doctor. He is a general surgeon today in Hartford.

Notwithstanding the hassle that doctors face . . . the diminished reimbursements, the omnipresent paper work, the specter of possible malpractice charges . . . the MGH Senior Surgeon has no regrets at having advised his son to become a doctor, instead of perhaps a lawyer.

"Occasionally a lawyer will rise to great heights," he said. "I had an uncle who was a very famous lawyer [Joseph Welch, whose dressing-down of Joseph McCarthy at the Army–McCarthy hearings spelled the downfall of the Wisconsin senator]. But if one is looking for service to the community or to the individual, it seems to me that doctors would be far ahead.

"The legal profession would be very intriguing. I'm impressed with its value. But to reach a decision, there usually has to be two lawyers, and often a judge and/or jury. In most instances, medicine tries to base its findings on a one-to-one basis. That should be tremendously cheaper any way you look at it." ■

Coach Raymond Berry and the other to an MGH psychiatrist.

Coach Berry joined his players in describing Dr. Armand M. Nicholi, Jr., as "one of the most valuable people in this whole operation and one of the biggest assets we have."

Patriots' General Manager Patrick Sullivan added that "we couldn't have turned our past failures into this year's success without his efforts."

The Patriots' management had invited Dr. Nicholi in early 1982 to work with the players after describing to him years of team failures and frustrations.

The players and coaches cooperated fully with their new psychiatric consultant as he worked behind the scenes. Only his family and a few close friends knew of his involvement with the team.

Recounting his experiences with the Patriots in a talk to MGH colleagues (Psychiatric Grand Rounds), Dr. Nicholi said that as he studied the team he realized that interpersonal conflicts had more to do with keeping it from success than any technical inadequacies. The disputes produced friction, impaired the functioning of the organization, and made the task of winning games more difficult.

"I predicted that once they succeeded in removing the long-standing feelings of distrust and discontent that characterized the organization, the team would begin to reach its potential," Dr. Nicholi said.

Describing the psychological experience of professional football, Dr. Nicholi said the very nature of life in the NFL fosters a state of chronic anxiety. When a team drafts a promising new player, he can represent a threat to someone else's job. And there is the ever present risk of a career-ending injury.

Dr. Armand Nicholi chats with injured tight end Lin Dawson of the Patriots.

In addition to encountering the full range of emotional problems that afflict people in their 20s, Dr. Nicholi found these other disruptions among the professional football players:

Severe depression almost always followed an injury and acted to slow recovery and rehabilitation. Symptoms of stress, such as irritability, sudden outbursts of anger, and a sense of a shortened career, often resulted from intense violent contact on the football field. Some players complained to the doctor of dreams of violence. He noted these symptoms comprise a syndrome called Post-traumatic Stress Disorder, first observed in Vietnam veterans.

Dr. Nicholi provided individual therapy for the emotional problems that were interfering with athletic functioning, and he also met with the players in small groups.

He reminded the players that the NFL draft spreads talent evenly throughout the league by having winning teams choose new players last. Thus, almost any team has the talent to beat any other team on a given Sunday.

Dr. Nicholi said that he tried to inculcate the basic principle that "in winning football games in the NFL, the mind and the will play a more important role than the body and skill."

The MGH psychiatrist also worked closely with the team's front office and players to remove long-standing obstacles between them. A great many changes took place, including the hiring of a new trainer, construction of new training and weight room facilities, transfer of the team's medical care to the MGH, and a new approach to negotiating contracts.

Even as conflicts between management and the players were resolved, however, existing difficulties between the players and the coaches deepened. Then, in the middle of the 1984 season, Raymond Berry, long admired by the team, came aboard as new head coach. As an example of team cooperation, the players agreed to a voluntary drug testing program, a first of its kind in professional sports, although Dr. Nicholi said the Patriots already were one of the cleanest teams in the NFL. The few players involved had taken either marijuana or cocaine. When newspapers "revealed" the story of drug use on the Patriots, they named players, some of whom had already been off drugs for the entire season.

Dr. Nicholi figured that the team should now come together as never be-

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Patriots' cornerback Ronnie Lippett prepares to haul down a Falcon ball carrier.

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A Psychiatrist Resolves Patriot Conflicts

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fore. But obstacles continued among the players themselves. Two key players on the offensive line, for instance, refused to speak to one another. Attitudes prevailed among many players that focused on self rather than on the team.

Prior to that pivotal Jets game in the 1985 season, Dr. Nicholi met with New England's offensive line.

"I reviewed all the changes that had taken place over the past year, all the obstacles that had been removed," he said. "I told the players that the only place they could look now was within themselves.

"I quoted outside observers as saying that the Patriots did not appear to be together as a team. Other teams ran out onto the field as a unit. The Patriots straggled out a few at a time and sat glumly on the bench, seldom speaking to one another and apparently lacking enthusiasm."

Dr. Nicholi told the players that a fundamental principle of all relationships involves the capacity to step out of one's own needs and to become aware of and sensitive to the needs of others. He encouraged them to take the time to know one another well and to give one another encouragement and support. The Patriots' veteran offensive guard, John Hannah, then spoke up:

"Doc, I don't think it's what you say that determines how one plays in a game but how one practices during the week."

Dr. Nicholi then shared a conversation he had with another player. The individual said Hannah's play discouraged him because he could not attain the veteran's level of accomplishment. When Hannah happened to speak to him, however, a rare occurrence, the other player felt an alliance and a motivation to try to emulate the nine-time Pro Bowl guard.

After describing that conversation, Dr. Nicholi noticed that Hannah spoke a great deal to other players in the locker room and on the bench. The result was a noticeable increase in discussions among the teammates during practice and games as they attempted to help one another play more effectively.

The night before the Jets game, Dr. Nicholi asked for and received permission to speak for 15 minutes to the whole New England team. The coaches agreed to wait out in a hallway.

Dr. Nicholi told the team a story. It was about a small town that held a tug of war every Fourth of July. One team consisted of 11 superb athletes. The other was made up of 11 ordinary citizens with no special prowess. One even had a lame leg.

The athletes were extremely well conditioned, but they were divided into cliques, argued a lot, and never worked together. Only two or three men pulled on the rope at the same time.

Members of the other team cared about one another, helped each other grip the rope properly, figured out a way to compensate for the handicapped person, and all pulled the rope at precisely the same second.

The team with the ordinary ability which pulled together won consistently.

In beating the Jets and going on a victory march to the Super Bowl, the Patriots made it clear that Dr. Nicholi's remarks had not fallen on deaf ears.

Sometime later, while at a pre-game buffet, John Hannah walked by Dr. Nicholi and stopped for a moment. "Hey, Doc," he said. "We've got a new fight song."

Then, tray in hand, he continued walking while singing:

"Getting to know you . . . getting to know all about you. . . ." ■

Patriots' quarterback Steve Grogan speaking at a recent MGH Psychiatric Grand Rounds. Retired offensive guard John Hannah, seated at right in first row, also spoke.

MGH
News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 46 No. 2 March 1987

Trying to Solve the Riddle of Radon

Using a nuclear camera, an MGH physicist has laid groundwork for charting the long-term health effects of a radioactive gas which exceeds recommended safety standards in an estimated eight million American homes.

Although smoking ranks by far as the country's leading cause of lung cancer, scientists believe that as many as 20,000 of 130,000 deaths each year from that disease may be attributable to radon, a colorless, odorless, and tasteless gas given off by the decay of naturally occurring uranium in soil and rocks.

Over the years, the lack of sufficient studies of radon, which seeps into houses through basement wall and floor cracks (which should be sealed) and through the water supply, have led to controversies among scientists.

They agree that the gas poses a real threat, but many argue that not enough is known of radon's effects upon the human body, and they ask at what level of radon's accumulation must measures be taken to avoid the risk of cancer.

For the past 2½ years, under a grant from the federal Environmental Protection Agency (EPA), a team headed by John A. Correia, Ph.D., of the MGH Radiology Department, has studied the action of a radioactive gas consumed in water by a group of 50 volunteers.

Dr. Correia, who is also Associate Professor of Radiology at Harvard Medical

(Continued on Page 4)

What motivates young people to pilot supersonic aircraft when one miscalculation can prove fatal? See story on Page 5.

Organ Transplants Brighten Prospects for Diabetics

For the first time since the MGH opened its doors in 1821, a number of patients afflicted with diabetes have walked out cured of their high blood sugars.

At the time of their admission, all were suffering from major complications which come from advanced stages of the disease.

Last April, an MGH surgical team gave a new kidney as well as an insulin-making pancreas to 32-year-old David Campbell of Raymond, N.H. He had suffered from diabetes since the age of 12.

Although he had received insulin injections twice daily to compensate for his deficiency of this hormone needed to regulate his blood sugar levels, complications had developed in recent years, including impairment of his vision and loss of feeling in his extremities.

Mr. Campbell became the first MGH patient to be cured of the hyperglycemia of diabetes. Although the benefits of pancreatic transplants in dealing with the complications of diabetes will only emerge in time, Mr. Campbell's extraordinary response to the transplantations (his blood sugar fell to normal immediately) so encouraged the surgical team that it has since performed the same procedures on 10 more diabetics, ranging in age from 26 to 44. The MGH is the only medical institution in New England to have performed pancreatic transplantations successfully.

Among the 11 MGH patients, blood vessel disease had left one totally blind, another confined to bed, and caused three to undergo amputation of a limb. Another patient had such advanced peripheral blood vessel disease prior to the operation that he lost a leg despite the transplantations.

Two of the patients, including the one

(Continued on Page 2)

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EDITORIAL:

Radon: Many Questions, Few Answers

Radon has become one of those "unimportant" subjects which transform into concerns. As a Page 1 article in this issue describes, scientists have known about this hazard for many years. What they did not know is that this colorless, odorless gas threatens hundreds of thousands of Americans in the sanctity of their own homes. How many Americans? How severely threatened?

Nobody really knows. It will take years before scientists have definitive answers to these and other questions. Perhaps the most important is "what dose over how long a period of time constitutes a significant threat to someone's health." And even that relatively straightforward question begs additional ones. Is the "someone" a child or an adult? Is the adult young, middle aged, or senior? Is that "someone" otherwise healthy or debilitated? Does he smoke? If so, how much and for how long? Did he once smoke but quit? For how long did he smoke and how much per day and how long ago did he quit? Has he been subjected to other lung infiltrates such as asbestos fibers? Again, how long and how much? Is the premenopausal female protected in some way by hormones? Or harmed by female hormones? Etc.

Then one might wonder how much relative effect the forms of radon exposure take. Is the risk from consumption of water from an enclosed radon-polluted well significantly dependent on how long a glass of well water sits before being consumed? Does the radon react with the metal of a pan in which the water is boiled before being drunk? If so, is there a worsening effect from the reaction or does the radon become less harmful? Or does it matter? How long would it take for boiling water to dissipate the radon into the air? Does airborne radon that seeps into a house react adversely with other kinds of gas that get trapped in the highly insulated, air-tight modern homes?

These are but a few of the questions which a scientist might ask. As investigators peel the onion by answering the first puzzling layer, they will undoubtedly uncover even more enigmas. Some questions which will arise may not resolve for many years. Others will prove unimportant. For this is the nature of science: always probing to explain the unknown and in the process often finding that the seemingly simple is exquisitely complex. But in the end the process leads us to surprising turns in the road of life. And that complex trip often brings us to new techniques and innovations or new safety guidelines and regulations that make our complex lives at once more simple and more complicated.

Diabetes

(Continued from Page 1)

who was bedridden, died after their transplant procedures because of infections. As for the others, however, Dr. A. Benedict Cosimi, the MGH's Chief of Clinical Transplantation Surgery, said that "all are doing extremely well."

They are back to meaningful daily activity and, for the first time in decades for many, they can eat without concern about sweets.

"As with all of the patients, the last four had both diabetes and renal [kidney] failure, but they had not contracted the other severe complications that beset the earlier patients," Dr. Cosimi said. "These four sailed through their operations and went home in just 10 to 14 days."

Three weeks after surgery, one patient, a fitness advocate, came to Dr. Cosimi and asked if it was okay to resume lifting weights. The doctor gave permission for the man to hoist 40 to 50 pounds. "Gee, I'm already up to 80," the patient admitted. Dr. Cosimi admonished him not to go any higher than that for the time being.

The patients, many from New Hampshire, come to the MGH Transplantation Unit about once a month for follow-up tests. Between trips to Boston, some also visit their family physician for checkups.

As of the middle of February, the 9 surviving patients have been doing well for from 2 to 10 months since their double transplants.

In addition to Dr. Cosimi, key roles in the care of the transplant patients have been held by Dr. Paul S. Russell, Chief of the MGH Transplantation Unit, and Drs. Francis L. Delmonico and Hugh Auchincloss, Jr., of that unit, as well as Dr. Nina E. Rubin, of the MGH Dialysis Unit, and Dr. David M. Nathan, Director of the MGH Diabetes Research Center.

Dr. Russell said his group began to focus on the problems of diabetes when it became apparent that about a third of the hospital's patients who needed kidney transplants were diabetic.

The results of kidney transplantations for diabetics measured up to those for nondiabetics. The success rate in each category was between 80 and 90 percent during the first year with good survival

Photographs: Pages 1, 5, 6, U.S. Air Force Photos; pp. 3, 4, 8, Myron Daniels; p. 7, courtesy of American Lung Association

Drawing: Page 4, courtesy of Radiation Control Program, Massachusetts Department of Public Health

A diabetic for 20 years, Paul Huot of Manchester, N.H., center, could once again eat sweets after receiving a pancreas and kidney at the MGH. Shown with him during a follow-up visit in the Transplant Unit are Drs. A. Benedict Cosimi, left, and Paul S. Russell.

thereafter. Despite this, however, the diabetic patients continued to encounter the ongoing effects of their disease, the threatened loss of vision or extremities due to poor blood circulation.

"We had to do something better for the diabetics," said Dr. Russell, who is also John Homans Professor of Surgery at Harvard Medical School. "In the simplest way of analyzing the problem, diabetes is a condition in which insulin is in short supply because cells in the pancreas that produce it have been destroyed. What we've been trying to do is make up that deficiency."

All of the patients to date, because of their advanced renal disease, have received both a kidney and a pancreas. As Dr. Cosimi explained, "Whenever a new treatment is introduced, it is generally used first on patients at the extreme of their condition to prove that the method is safe and effective. Our work has had a success rate of 82 percent."

Even though transplantation of the pancreas can unquestionably reverse the sugar metabolic effects of diabetes, only time will show how well a functioning, donated pancreas can prevent the secondary course of the disease from worsening.

"We believe it stands to reason that if the sugar metabolism is reversed to normal early enough in the illness we should reap tremendous benefits from this new approach," Dr. Russell said.

As with the liver, implantation of a pancreas is generally more complicated than that of a heart. Vessels that must be connected to a new heart are large and accessible while those linked to a pancreas are thin and flimsy, and often at high risk for bloodclotting. In addition, measures must be taken to assure proper drainage of pancreatic secretions. A pump, the heart does not secrete anything.

All of the MGH patients who received a donated pancreas still have their own. Only the insulin production failed in their natural organ. It continues to funnel enzymes into the first portion (the duodenum) of the small intestine to help with digestion.

The surgeons do not disturb the original pancreas, situated behind the stomach. Instead, they install the new pancreas outside the abdominal cavity but near the patient's bladder. A portion of the donor's duodenum is used to link the donor organ to the bladder. Thus, the bladder carries off for disposal not only urine from the new kidney but also unneeded digestive juices from the donor pancreas.

When a donor's pancreas is removed and given to a patient, the spleen goes along with it. Not until after the pancreas is installed and in a satisfactory position is the spleen removed. The reason for the delay is to maintain a normal vascular anatomy and thus assure good blood flow through the graft during the initial period.

"We're constantly thinking of how we might be able to do our job more simply," Dr. Russell said. "If we could just get the islets of Langerhans, which contain the insulin-making cells, out of the donor pancreas and transfer only that portion to a diabetic patient, the result might be just as effective and more safe."

At the MGH and other major medical centers, researchers have been trying to do that experimentally, but without sufficient success.

Lacking a satisfactory technique to extract the islets, the investigators lose many of them. Only 15 or 20 percent are obtained, not quite enough to permit a transplant. Another problem has been that the islets may be more vulnerable to rejection than an entire pancreas.

In mice, separating islets and using them effectively in reducing the blood sugar of diabetic mice was proven practical long ago. One can even use islets obtained from multiple donors. But worldwide not a single, successful, islet transplantation from one human to another has been reported.

In recent collaborative work between members of the Transplantation Unit and the MGH's Department of Molecular Biology, researchers adopted a newer tack. They thought: Why not go right to the basic laws of heredity and try to

(Concluded on Page 4)

This mouse was provided with human insulin genes to regulate its blood sugar. Similar experiments are being conducted with diabetic mice to see if such genes can cure the disease.

Human Genes Shield Mice From Diabetes

(Concluded from Page 3)

In the Molecular Biology Department, Dr. Richard Selden looks through a microscope at a type of nonpancreatic mouse cell to determine if it is producing human insulin.

manipulate the gene governing insulin production.

Last May, in an article in the British scientific journal Nature, *an MGH team reported on the production of mice containing human insulin genes and how these genes correctly regulated blood sugar levels.*

The "transgenic" mice were generated by injecting the human insulin gene into mouse embryos. The genes then became a part of the embryos' chromosomal makeup. Studies showed that offspring of the transgenic mice inherited the human gene.

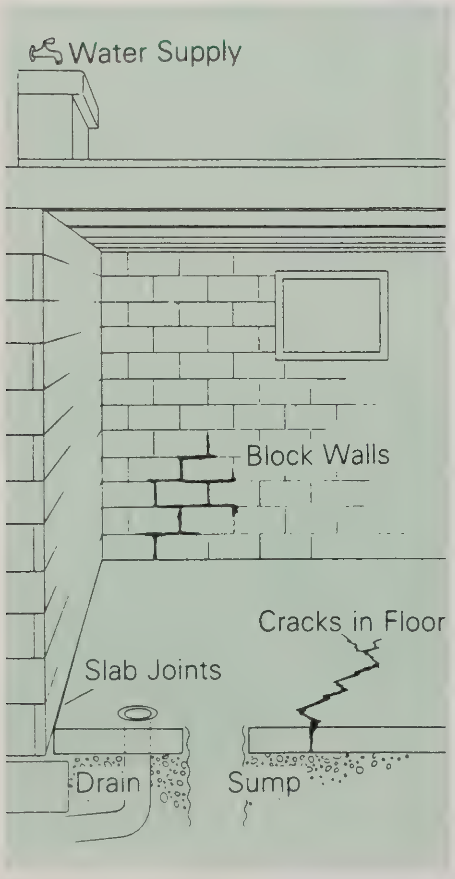
The researchers closely monitored the action of the human insulin in the pancreatic islets of the mice and verified that the insulin production adjusted well to changes in blood sugar levels caused by various agents.

Authors of the report in *Nature* were: Richard F. Selden, Ph.D.; Kathleen Burke Howie, Technician, and Howard M. Goodman, Ph.D., from the Department of Molecular Biology, and Dr. Marek J. Skoskiewicz and Dr. Paul S. Russell of the Department of Surgery.

Current MGH studies are looking at the possibilities of producing human insulin in nonpancreatic cells, such as fibroblasts from connective tissue.

Even if the nonpancreatic cells can make insulin, an overriding question will be whether they can be programmed to release insulin in a normally regulated fashion. Will they produce more insulin if sugar levels rise and less when the sugar drops?

"It's tricky business," Dr. Russell said, "but there could be a real future to this project for our patients." ■



Radon's common points of entry into a house

Smoking Magnifies the Danger of Radon

(Continued from Page 1)

School, employed xenon, long used in nuclear medicine studies, because it has the same chemical properties as radon, differing only in tissue solubility.

The decaying products of radon, such as polonium, are deposited as solids in the lung and irradiate lung tissue, thus causing cell damage. Xenon, on the other hand, passes out of the body almost entirely. Its emissions of radiation can be detected externally throughout the test while those of radon cannot.

In the MGH studies, a mathematical correction for the tissue solubility difference made it possible to use xenon as a safe and effective analogue for radon.

"What we did," Dr. Correia said, "was use the regional imaging capability of a gamma camera to determine how much radioactivity was present and for how long in various organs of the body after a test participant drank water containing a dose of xenon equivalent to a dose of radon."

The MGH researchers found that among 25 men and women xenon cleared the body in between 12 and 15 hours. "There's very little retention, less than one one-thousandths of the initial dose," Dr. Correia said. "The most likely place it is retained is in fat."

Dr. Correia's team found that, on average, a xenon molecule spent 40 minutes in the stomach, 80 minutes in the small intestine, 122 minutes in the ascending colon, 175 minutes in the descending colon, and 78 minutes in the liver.

The MGH physicist said radon in water presents a less significant hazard than when the gas is in the air. Inhalation presents a direct path to the lungs and other organs while swallowing the gas sends it through the gastrointestinal tract, a route that leaves it less concentrated and mixed with other gases before finally reaching the lungs to be exhaled.

Data gathered in the MGH research can help to determine the size of a radiation dose, but Dr. Correia said the question of disease risk is another matter: "This is just a step along the way."

Dr. Correia's associates included Steven Weise, a research engineer in radiology; Ronald Callahan, Ph.D., who directs the MGH nuclear medicine phar-

Pilots Find a Special Fulfillment in Flying

The U.S. Air Force spends about $1.5 million to train each of its pilots. By the end of the rigorous one-year program, the military has a pretty good assessment of the capability, personality, and character of each trainee.

Less clear, however, is his motivation to fly. What drives a man to want to soar into the sunlit isolation high above the earth? Some say a craving for a few golden moments of pure joy. But accompanying this exhilaration is an ever present danger of death if something should go wrong.

Dr. David R. Jones, who directs the Neuropsychiatry Branch of the School of Aerospace Medicine at Brooks Air Force Base in Texas, told a recent MGH meeting that fliers see themselves as qualitatively different from other people.

Speaking at a Psychiatric Grand Rounds, Dr. Jones said that fliers share an inexpressible bond, a secret experience that unites them and sets them apart from other mortals. In the sky, they find a long-sought attraction that enables them to be completely fulfilled.

Dr. Jones quoted famed test pilot Chuck Yeager as saying in his autobiography that risks are the spice of life. . . The butterflies are fluttering, but you treat fear as if it is a high-energy candy bar. . . It keeps you alert and focused.

A retired Air Force colonel, Dr. Jones compiled almost 2,000 hours of flight time, including 300 hours during combat, in his 28 years in the military. He served 15 of those years as a flight surgeon.

He said that although the attraction of flying can be deep and emotional, the motivation can also stem from a simple, purely rational decision.

On the one hand, he said, some pilots claim that all their lives they have wanted

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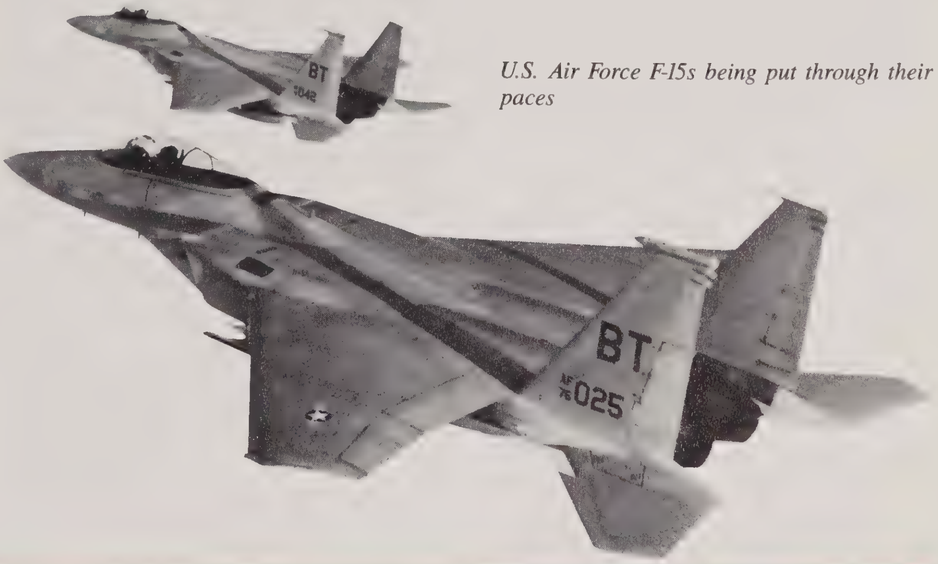

U.S. Air Force F-15s being put through their paces

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macy; and Dr. H. William Strauss, head of nuclear medicine in the Department of Radiology.

From uranium to radium to radon to cancer. Workers in poorly ventilated pitchblende mines, which yield uranium ore, became in years past all too familiar with this chain of events.

Most people considered radon a peril unique to miners. If it ever reached the ground's surface, they thought, winds would carry the gas aloft and dissolve it.

What these people failed to realize was that uranium can be found in many types of terrain. Areas laden with granite, for example, are rich in radioactive minerals, including uranium.

The terrain may be porous and support houses with basement openings that allow the gas to enter. In a setting—modern buildings particularly—where air exchange is poor, the gas may become trapped and more concentrated.

In the case of gas-laden water, communities served by reservoirs suffer little risk because the gas escapes into the air before the water enters a distribution system. Water drawn from deep, covered wells poses a problem because no escape route for the gas exists until water is turned on in a building.

Apathy over radon ended when health and other public agencies, armed with newly developed techniques for measuring radon levels, came upon homes dangerously high in accumulations of the gas. The so-called Reading Prong, which cuts across portions of New Jersey, Pennsylvania, and New York State, harbors areas of heavy concentration.

Although the EPA set a safety standard of 4 picocuries (a unit of radioactivity) per liter of air, one home in Pennsylvania was found to have a concentration of radon that measured 2,700 picocuries. In one community in New Jersey, a study of 38 houses showed that 30 exceeded the radon safety standard. Gas levels ranged from 100 to 250 picocuries.

As a comparison, the EPA estimates that constant exposure to 20 picocuries may yield a lung cancer risk comparable to that faced by a person who smoked for the same length of time between one and two packs of cigarettes a day.

A reading of 200 picocuries would be 1,000 times the average radon level found outdoors and, by some estimates, equivalent to more than 60 times a nonsmoker's cancer risk.

Edward W. Webster, Ph.D., Chief of the Radiological Sciences Division at the MGH, emphasized that assessment of the risk from radon must take into account both its level of concentration and the length of time an individual was exposed.

"Damage from radiation is cumulative," he said. "The longer the exposure, the more severe the damage."

Dr. Webster, who is also Professor of Radiology (Physics) at Harvard Medical School, added that smoking complicates radon studies.

"It muddies the waters," he said. "Recent data suggest that the effects of radon are multiplied among smokers."

Theoretically, he said, radon has no real safety threshold. Even normal levels of radon may create some element of health risk.

To help homeowners determine whether radon poses a threat to them, the EPA maintains an updated list of companies qualified to measure indoor levels of the gas.

The list is provided, in conjunction with state agencies, not only as an accommodation but also to protect owners from unqualified operators seeking to make quick and easy profits. ■

Flying Can Become Almost a Passion

(Continued from Page 5)

to fly . . . never wanted to do anything as much as wanting to fly.

On the other hand, there are also pilots who admit that at the time of life when all their peers were picking their professions, they chose to go into flying because the Vietnam War was on, and they figured that flying was better than mud. Or "I was going into the Air Force anyway because I had a scholarship through ROTC, and it looked like fliers get promoted quickly."

For most, however, once flying gets into the blood, it becomes almost a passion. Fliers make sport of the closeness of death.

As Chief of Neuropsychiatry at Brooks Air Force Base, Dr. Jones encounters fliers with psychiatric problems and must decide whether their motivation to fly is healthy or not. Should he ground them? If so, what conditions must he set for restoration of flying status?

Motivation can be influenced by both fear and anxiety – anxiety being a feeling of fear which is out of proportion to the actual threat. Separating fear from anxiety to determine the basic problem is often difficult because each presents itself in the same manner, emotionally and autonomically.

On occasion, a pilot trainee will do very well through most of a flying program and then fail. Dr. Jones told his MGH audience of a young man who sought his wings because his father, an Air Force sergeant, always worshiped fliers and wanted the son to become one. As graduation approached, however, the son realized that to succeed would place him at a higher level than his father. His anxiety over this situation caused his disqualification, but he blamed the doctor for disqualifying him, rather than cooperating with a treatment program, and thereby avoided facing the painful truth.

Some would-be pilots are daredevils. They want to get out and fly under bridges. The fact that the last person to try waited until low water does not faze them. The water is up, but they will attempt it anyway.

A mid-air refueling operation such as this demands precise control of both aircraft.

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Two F-16s during an exercise over Utah

"I'm not interested in letting young men use $15 million airplanes to show how brave they are," the doctor said. "We're simply not in that business."

What happens when a pilot who always loved to fly suddenly develops a phobia and claims, "I can't stand it anymore. Every time I get into the plane, I start shaking. I have nightmares the night before."

"In no case has the primary difficulty been with flying," Dr. Jones said. "It has always been something else, and once that has been cleared up, the flying straightens out pretty well."

The treatment calls for a brief but intensive psychotherapeutic intervention along with the use of relaxation techniques and mental imagery of flying. These methods can later be repeated within an aircraft itself.

Dr. Jones said that while airborne a pilot must devote 100 percent of his attention to flying.

He told of a forestry service pilot who took off with a load of borax to help snuff out a forest fire. On takeoff, only one wing flap was down, giving the heavy plane an abnormal drag and thrust. The pilot immediately dumped the borax, pulled up the functioning flap, flew through the soft tops of some trees, and landed safely.

"If he had done anything else . . . if he had even paused for a moment to think of what had to be done . . . he would have been killed," Dr. Jones declared. "That's the kind of sharpness pilots need."

While flying an F-105 above the Utah desert, another pilot made a mistake. His fighter plane hit the ground, bounced into the air, and flipped over. From 600 feet, the pilot ejected . . . straight downward. He hit what Dr. Jones described as "the only mud bank in Utah," was picked up by the only helicopter flying in that area that day, and was rushed to a hospital.

A year later, fearing only that he might be afraid, the flier took off in another plane for his first flight since his near tragedy. The flight was uneventful. "I was delighted," the man said. "I wasn't afraid."

But then the story took on a strange twist. The pilot began having nightmares, not about himself but about the safety of his wife driving alone in the family automobile. Instead of vanishing, his fears were simply being focused elsewhere.

Dr. Jones said that the most common situation he encounters is the flier who claims he is not afraid to go up but develops headaches, backaches, or stomach pains when he does. "They know sub-

Breaking the Smoking Habit With Hypnosis

The U.S. Surgeon General recently underscored the importance of breaking the smoking habit when he reported that tobacco smoke can endanger nearby nonsmokers who inhale the fumes.

In a report to Congress, Dr. C. Everett Koop warned that smoke which drifts from burning tobacco actually contains higher quantities of some cancer-causing substances than smoke inhaled directly by the smoker.

The report in particular cautioned parents against smoking in the presence of children.

The mounting evidence implicating environmental tobacco smoke in disease is likely to spark a new surge of appeals for direct medical help against smoking.

At the MGH, the Psychiatry Service's Psychosomatic Medicine Unit, directed by Dr. Jerrold F. Rosenbaum, employs a variety of methods to curb smoking. The one which has appealed most to patients is hypnosis.

Once relegated to the stage, hypnosis in the past few decades has earned an ever widening role in helping health professionals to treat such problems as pain, obesity, anxieties, phobias, alcoholism, and smoking.

Although the term comes from Hypnos, the Greek god of sleep, hypnosis is not sleep at all. The hypnotized individual is fully conscious.

What hypnosis does is induce people to concentrate so deeply on certain mental perceptions that other perceptions are excluded from the mind. Think, for instance, of someone engrossed in a book. His attention may become so riveted to a passage that he loses all awareness of what is going on around him. It is a form of self-hypnosis.

A psychiatrist or psychologist trained in hypnotherapy would urge a hypnotized patient who wants to stop smoking to focus on positive thoughts such as a desire to develop a healthy body, which would automatically exclude smoking. Lest anxieties be stirred up, negative thoughts, such as fighting the urge to smoke, are avoided.

Snuffing out the last cigarette? It could be a wise move.

Dr. Thomas P. Hackett, Chief of Psychiatry at the MGH, established hypnosis in medical care at the hospital in the mid-1960s when he directed the MGH Psychiatric Consultation Service. All psychiatric residents and many members of other medical disciplines took the available courses on hypnosis (*MGH News,* March 1971).

In 1982, in the first follow-up study of hypnosis for smoking conducted at the MGH, Drs. David V. Sheehan, now of the University of South Florida, and Owen S. Surman reported on the outcome of treatment given to 100 consecutive patients.

They wrote in the *Journal of the American Society of Psychosomatic Dentistry and Medicine* that 21.3 percent were still abstinent 1½ years after treatment. Of those who resumed smoking, approximately 60 percent had reduced their mean cigarette consumption by 40 percent.

The two psychiatrists also reported, however, that nearly half of the patients gained weight. In the group that stopped smoking, 75 percent had a mean weight gain of 10.7 pounds each.

In early 1986, three MGH psychologists—Lee Baer, Robert J. Carey, Jr., and Susan R. Meminger, all Ph.D.s—reported on another follow-up study, this one covering 137 consecutive patients hypnotized for smoking cessation. A key goal was to investigate the relationship between hypnotizability and treatment outcome.

After hypnotizing (or attempting to hypnotize) a patient, an investigator made suggestions. The patient might, for example, be asked to experience a vivid dream or to regress to a grade school age. The responses were later compared with standardized norms to determine the level of hypnotizability. Treatment followed.

Reporting in the *International Journal of Psychosomatics,* the researchers wrote that hypnosis had little chance to end smoking among patients with low hypnotizability, but that among patients with medium or high hypnotic ability, the treatment produced results equal to or better than those achieved with other methods. These include techniques such as rapid smoking to create an aversive stimulus, chewing nicotine gum as a tobacco substitute, or shifting from high-

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consciously, of course, that there is no underlying disease," he declared, "but they say, 'Gee, if I were only grounded, I'd be okay.'"

To deal with such difficulties, Dr. Jones asks three questions:

Why not fly with these symptoms? The well-motivated flier would say, "I'm sick. Treat me so I can get well and fly again." The poorly motivated man would say, "If I flew with these symptoms, I might get killed."

When we cure you, are you going to fly? The healthy flier's comment: "Get me back up. That's why I came here." The poorly motivated pilot: "Yeah, I guess so." His anxiety will be evident even before he answers the question.

What do you think about these symptoms? The well-motivated individual wants to know if he is really sick and is his career going to be hurt. The poorly motivated flier says, "I just need to be grounded, and I'll be okay. If I don't fly, it won't be a problem to me."

Of nearly 9,000 people accepted into Air Force flight school during a five-year period, about 20 percent failed, mainly as a result of inability to adapt to flying. Only about three percent were medically disqualified.

What are the successful Air Force pilots like? Dr. Jones generalized:

They are self-sufficient, love responsibility, do not tolerate imperfection very well, have an average IQ of 125 to 130, are energetic and courageous (defined as understanding perfectly well what the dangers are and doing it anyway), and are team players but do not like to discuss emotional matters.

They also tend to think of short-range goals: What do you plan to do? I plan to fly. What do you plan to do after that? I plan to fly some more. ■

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Hypnosis Relies on a Cooperative Attitude

(Concluded from Page 7)

nicotine to low-nicotine cigarettes, and then stopping.

Low hypnotizables in the study had abstinence rates of approximately 20 percent one week after treatment. The rates dropped to zero by six months. In the first week, medium-to-high hypnotizables recorded 60 to 70 percent abstinence rates which later fell into the 20 to 30 percent range after one year.

Weight gain findings were virtually the same as those reported in the Sheehan-Surman study.

In the late 1970s a former MGH psychologist, Arreed F. Barabasz, Ph.D., found that isolation enabled researchers in the Antarctic to focus more easily on internally generated imagery. Just five or six hours of isolation, he said, might double one's chances of being deeply hypnotized. However, the basic question that Dr. Barabasz, now of Washington State University, was trying to answer—whether hypnosis susceptibility can be altered—remains a subject of debate.

Dr. Surman, affiliated with the Psychosomatic Medicine Unit almost since its inception in 1975, said that various methods used in hypnotizing individuals are equally effective.

The disappointing drop-off in smoking abstinence among people who were hypnotized is strikingly similar to the long-term results of other antismoking methods. No one can offer a definitive explanation for the resumption of smoking, but theories abound.

"Some people come into hypnosis with unrealistic expectations," Dr. Baer said. "Hypnosis is not magic. The patient has to want to stop smoking. People who come to our clinic simply to please others, their spouse or their family doctor for instance, may not really try."

Dr. Surman said most of those who succeed prove to be highly motivated. The timing seems to be right for them and they choose hypnosis as the vehicle for enacting their wish for change.

The desire to quit smoking may stem from a health scare. That was true for Dr. Surman, who gave up smoking 8 years ago at the age of 35 because of the risk of developing emphysema.

Dr. Baer described hypnosis as more cost effective than most other techniques used to break the smoking habit.

"Many other procedures require the patient to return to the clinic 8 to 10 times," he said. "The hypnosis patient comes in once for an evaluation and a second time to be treated. He generally doesn't have to visit again."

There is usually a one-month wait to enroll in the hypnosis program.

Treating the patient includes instruction on self-hypnosis. Hypnotizing oneself takes only 20 to 30 seconds. Each patient is advised to do this up to 10 times a day during the first few weeks as nicotine leaves the system.

The Psychosomatic Medicine Unit's Hypnosis Clinic, whose staff also includes William E. Minichiello, Ed.D., and Marilyn Zegman, Ph.D., is planning studies to determine whether the antismoking results of hypnosis can be enhanced by the concomitant use of other treatments. Other studies already have produced preliminary data showing an added benefit from nicotine chewing gum when used by patients involved in behavior modification programs.

"Just as alcoholics do, smokers only fool themselves when they say, 'I can stop whenever I want to.'" Dr. Surman said. "In the face of evidence now that smoking can adversely affect others nearby, smokers should not wait for a better treatment to come along but should try to break their habit by using the available modality most attractive to them. People should look upon smoking for what it really is . . . a public health scourge." ■

Dr. Lee Baer with a hypnotized patient

MGH
News

Massachusetts General Hospital, Boston, Massachusetts Vol. 46 No. 3 April 1987

Revised Burn Care Improves Chances for Survival

A dozen years ago, if a person over the age of 50 suffered massive burns, chances of survival approached zero.

Today, as a result of remarkable advances in burn care, a severely burned individual past 50 can often look forward to many more years of life.

This is one of the highlights of a report on burn care at the MGH between 1974 and 1984, as compared with the hospital's experience with burn patients during the previous 35 years.

In 1974, when Dr. John F. Burke became Chief of Trauma Services at the MGH, he initiated a method of burn treatment that he had introduced five years earlier for children at the MGH-affiliated Shriners Burns Institute, where he had been Chief of Staff.

The treatment, which soon became standard at the MGH, called for prompt excision of dead tissue from the burned area followed by immediate closure of the wound.

Conventional treatment, still employed at many centers, leaves the burned tissue in place for as long as a month until it sloughs off, and then the wound is closed. Supporters of this method argue that early surgical excision might sacrifice more tissue than really necessary.

The 9.5-year study, published recently in the Annals of Surgery, *showed, however, that with use of the new treatment mortality at the Adult Burn Center fell from 24 percent in 1974 to an average of 7 percent between 1979 and 1984.*

In addition, Dr. Ronald G. Tompkins, principal author of the journal article, reported:

"The most extensive increases in survival during 1974–1984 were seen in the treatment of elderly patients and patients with massive burn injuries."

(Continued on Page 2)

In the Sumner M. Redstone Burn Center, Landa Linse, RN, tends a badly burned patient by working through armports in a transparent wall around the patient's bed.

Exploring New Ways Of Repairing Bone Defects in Young

When an infant comes into the world with a bone deformity, usually involving an arm or a leg, an orthopedic surgeon can often correct the malformation, but sometimes it defies solution.

Limb deformities are common birth defects. Sometimes a piece of bone is missing, or extra tissue is present. Some of the problems are hereditary, while others are of unknown cause.

At the MGH, specialists are trying to develop broader options for surgeons to consider when confronted with bone defects in newborns.

In laboratory studies that he initiated, Dr. David J. Zaleske, an MGH orthopedic surgeon, and orthopedic residents collaborating with him, have discovered unique properties in cartilage. They hope that one day this knowledge will permit the reconstruction of severe congenital or injury-induced deformities that now resist repair in growing limbs.

If a child suffered severe limb damage in an accident, for instance, the researchers theorize that perhaps repairs will one day be possible through a transplantation of still developing cartilage.

To the layman, cartilage is best known as connective tissue found at the end of bones. During fetal development, however, the entire skeleton of the fetus is principally cartilage.

Working with mice, Dr. Zaleske and his team found that only two or three days before a mouse is born, and for the first several days after birth, its skeletal structure, being mainly cartilage, is not so "fixed" that changes and adaptations can-

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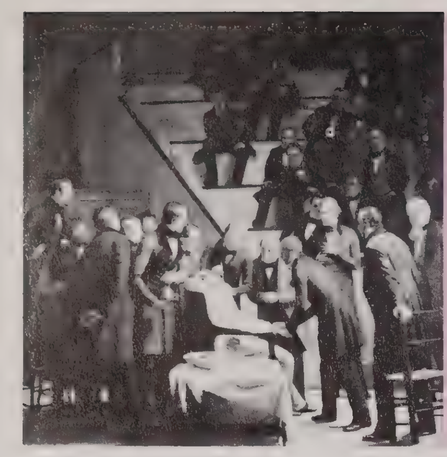

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EDITORIAL:

Medical Advances Will Be His Legacy

The death last month of Arthur O. Wellman represents much more to the MGH than the loss of its greatest benefactor. To many, it is true, Mr. Wellman and his wife, Gullan M. Wellman, were the donors of $15 million to the hospital. It was this original $15 million pledge that launched the hospital's $169 million Capital Campaign. That $15 million is believed the largest sum ever given until then by a single donor to an American teaching hospital and established the Wellman Research Building. The *Boston Herald* announced the gift in a front page article in which Mr. Wellman explained his motivation: "The MGH is the best hospital in the world. It needed the money, and I had it."

On February 14, 1981, the *Boston Globe* editorialized: "If more hospitals had friends like Arthur and Gullan Wellman of Brookline and Palm Beach, there might be more hospitals like the Massachusetts General Hospital."

On his 88th birthday Mr. Wellman gave another $1.7 million to fund the world's largest biomedical laser research laboratory.

What set Mr. Wellman apart was not his philanthropy. Nor was it his devotion to the MGH. No. It was a combination of traits that made him the youngest 92-year-old that most of us have ever seen. Foremost, he had a zest for life that never flagged. No philanthropist ever enjoyed more the art of giving. To him the monetary gift was merely the first course of a gourmet meal. He took an unusual interest in watching what he called "his investment" at work. Every week and at times every day he would discuss from his Florida home with Dr. John A. Parrish, Director of the Wellman Laboratories of Photomedicine, the progress of research. It was easy to understand what had made Mr. Wellman a successful industrialist. When he saw a nonscientific problem that a lay person could address, he would suggest a solution. He would focus on the bottleneck and persist in addressing it until it was resolved. No detail escaped his attention.

For the last ten years he fought leukemia. During his final few weeks the disease was sapping his life. But not his determination. He would share his enthusiasm about the MGH by writing letters to hospital officials he had grown to know. Within two weeks of his death he telephoned the hospital's News and Public Affairs office to follow up another letter he had written. Never was his enthusiasm for the research of the Wellman Laboratories any greater. He relived some of the accomplishments of the young laboratory. But his voice became most animated when he described the current research and predicted future breakthroughs. Those advances will be his legacy.

Burn Care

(Continued from Page 1)

He wrote that those above 50 years of age "showed consistent improvement in survival for all burn sizes. We believe that this reflects the more aggressive treatment approach centered around prompt eschar [dead tissue] excision and immediate wound closure that is undertaken even in older patients."

MGH records indicate there was little change in mortality rates from burns between 1939 and the early 1970s. But then, with what is called today's state-of-the-art care, patients began surviving well beyond the age of 70.

"When it comes to caring for small burns in young people, the mortality everywhere is almost zero," said Dr. Burke, who is also Chief of the MGH–M.E.E.I. (Massachusetts Eye and Ear Infirmary) Trauma Center. "Treatment for a medium-sized burn covering about 30 percent of body surface area is also good. But then the statistics change.

"While the MGH has shown it is very good at treating big burns in young people, you begin to see a fall in survival of such patients elsewhere. As for the elderly, we still achieve quite good results, except for the very aged, while at many centers a very serious mortality rate is noticed."

Hospital stay for a patient receiving the MGH burn technique is usually about half as long as the hospitalization for patients who undergo the older method of care.

In late 1981, Dr. Burke introduced artificial skin to the care of extensively burned MGH patients. Developed by him and a team of M.I.T. scientists led by Prof. I. V. Yannas, artificial skin has been crucial to the survival of some patients.

A Cape Cod man in his mid 70s suffered burns over 60 percent of his body when in 1983 he used gasoline to start a leaf fire. Artificial skin saved his life. In another instance, a 90-year-old woman suffered 40 percent burns in 1985 when she started a kitchen range to make tea and her robe caught fire. Again, artificial skin made the difference.

Photographs: Pages 1, 3, 5 (upper), Myron Daniels; p. 4, courtesy of Dr. David Zaleske; p. 5 (lower), courtesy of Dr. Allan Hamilton; p. 6 (upper), courtesy of Dr. Marcia Goldberg; p. 6 (lower), courtesy of Dr. Robin Avery; p. 7, Scott Davis

Drawing: Page 8, courtesy of MGH Planning Office

Head Nurse Elizabeth Dickerson, RN, right, and Carol Vivona, RN, check a patient's heart monitor in the burn center.

"The last time I saw them they were fine," Dr. Burke said. "Neither patient would have had much of a chance if it were not for artificial skin."

More recently, new work has focused on using the patient's own epithelial cells grown in tissue culture to provide skin for grafting over burns. The work of culturing the cells was pioneered in the Harvard Medical School laboratory of Dr. Howard Green, Chairman of the Department of Physiology and Biophysics. Sheets of human skin have been developed from pieces of skin the size of a postage stamp and grafted on patients in the Shriners Burns Institute.

Dr. Burke stressed that burn care is not like some other treatments. To cure appendicitis, you remove the appendix. For a headache, an analgesic drug will do the trick. Burn care, Dr. Burke said, is not just one single treatment; it is a coordinated system of many different treatments:

"Massive burns are the most severe trauma the body can sustain. The patient receives a very extensive series of individual treatments. Everything has to fit together to form a cohesive, logical system that gets the patient well."

In the September 1986 *Annals of Surgery* report on MGH burn care up to 1984, the authors pointed out that the contributions of allografts (skin from a person other than the patient) and immunosuppressive drugs, and the more recent use of artificial skin, influenced survival only in people with massive burns and did not account for the bulk of the improvements reported in the article.

Pain continues to be a major problem for burn patients. However, for the most part, as soon as the open wound is closed, the pain subsides, at least at that site. Usually, skin grafted onto a wound comes from another part of the patient's own body, his thigh or buttocks. Until the donor site heals, probably in a week's time, the patient may continue to feel uncomfortable, although physicians today have a much better understanding of how to manage pain with drugs. Once home, even the patient with the worst burns is often unable to remember the pain.

The greatest danger to a burn patient who survives the first few days is infection. But Dr. Burke said it is unusual for the Burn Center to lose a patient because of bacterial infection.

"In small burns where we can reliably close the wound in a very short time, infection has for all practical purposes disappeared," the doctor said. "We see infection now only in very large burns [covering 70 percent of the body or more] where it is not possible to close the entire wound immediately."

In May of 1984, the MGH replaced its 10-bed adult burn unit with a new one that incorporates every technological advance for the care of burn patients. The Sumner M. Redstone Burn Center honors a Massachusetts businessman and philanthropist who gave a sizable gift to establish the floor. Mr. Redstone also very generously helps to support the hospital's burn research.

To minimize the chance of infection among badly burned patients, the center's intensive care area includes four Bacterial Controlled Nursing Units (BCNUs), developed by Dr. Burke.

Each BCNU is a six- by ten-foot enclosure with transparent walls extending from floor to ceiling, washed by bacteria-free, optimally heated and humidified air. The transparent walls allow patients to see, speak to, and hear others outside the cubicle. At the same time, the staff can see in and can perform necessary tasks using gloved armports in the plastic walls so that they never bring bacteria into the patient's environment. The bacteria-free air within the BCNU moves in a laminar flow (one direction, away from the pa-

(Concluded on Page 4)

THE
SUMNER
M.
REDSTONE
BURN CENTER
1985

Massachusetts businessman and philanthropist Sumner M. Redstone helped to establish the new burn center. He also supports MGH burn research.

Cartilage Transplant Mends Joint Defect

(Continued from Page 1)

not be performed surgically.

Dr. Zaleske and Dr. Michael J. Wolohan removed cartilage from a knee joint of a batch of newborn mice, thus creating a deformity which the animals carried into adulthood. These mice later served as so-called controls to be compared with another mouse population which underwent the same tissue removal as newborns but then received treatment.

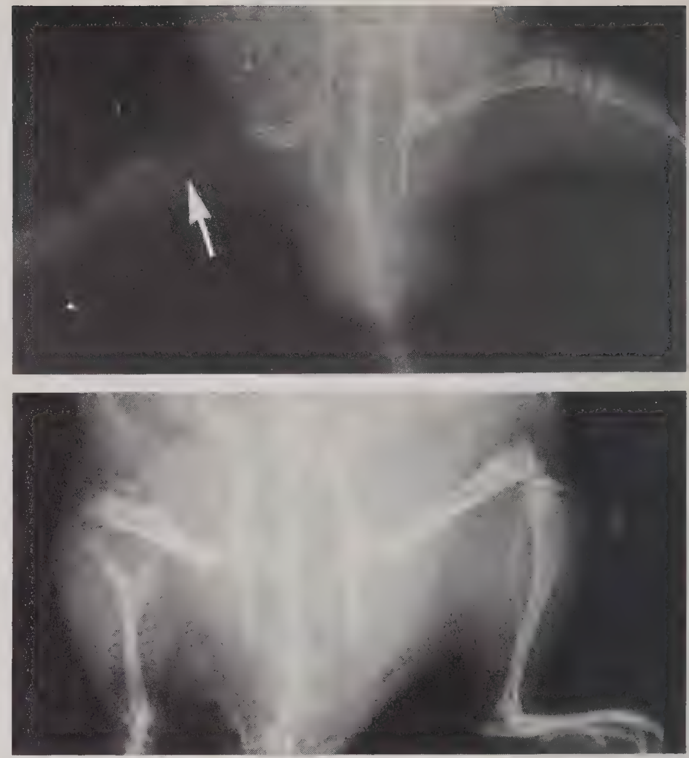
The treatment involved taking appropriate cartilage from mouse embryos and transplanting it into the disabled knee joints of the second population, in effect replacing what had been removed earlier.

The treated legs not only wound up looking better than the untreated deformed legs in the control group but also functioned close to normal.

"There are many questions which remain unanswered, such as longevity of joint function," Dr. Zaleske said, "but to date we consider the results of our work to be promising."

Scores of such transplantations were conducted in the laboratory of the MGH's Embryology–Teratology Unit, which specializes in the study of birth defects. Its Chief, Dr. Lewis B. Holmes, served as a consultant. The laboratories of Dr. Henry J. Mankin, MGH Chief of Orthopaedics, assisted in analyzing the data.

Drs. Zaleske and Wolohan already have carried their research a step forward. They have transplanted cartilage into a mouse to correct a bone defect with which the mouse was born.



Top X-ray photo shows a 2-month-old mouse; its right hind leg failed to develop (see arrow) following surgical removal of knee cartilage after birth. In bottom X ray is another mouse which had the same tissue removed but then replaced with cartilage from a mouse embryo. The leg subsequently developed almost normally.

The animal, provided by Dr. Holmes, had a hind leg which was deformed in part because of a missing segment of shinbone (tibia). The researchers took corresponding cartilage from a normal litter mate and transplanted it into the crippled animal. Although the investigators have not completed their evaluation of this phase of work, they are encouraged so far.

Dr. Zaleske broke ground for these studies a decade ago when he was himself a resident in orthopedics. Working on rabbits, he found that if a joint were surgically removed it could be put back and, with arteries and veins hooked up again, resume normal growth. This meant that the cartilage cells (chondrocytes) would survive and function normally again.

In subsequent work with Dr. Waldo E. Floyd, Dr. Zaleske studied how cartilage developed in the mouse model. They demonstrated that cartilage cells elicited their own blood supply and that it really was not until as late as the ninth day after the birth of the mouse that these cells obtained such nourishment. This implied that in a transplantation the cells could do

Burn Care

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tient) so that the bacterial count is kept at a minimum.

The BCNU also features a Nursing Assist Bed, another of Dr. Burke's innovations. The bed contains multiple hydraulic lifts to help nurses move and turn the patient, who in addition to suffering severe burns may be hooked up to a respirator, cardiac monitor, and other critical care devices.

Hand burns, while usually not life-threatening, can cause devastating physical disabilities. With early excision of dead tissue and prompt wound closure, however, Dr. Burke said "we can now get 95 percent of burned hands back to normal function."

He said the treatment prevents inflammation from getting down around the tendons and joints of the hands, where it can cause stiffness. Previously, everybody who had dead tissue left on his hands developed at least a superficial infection.

"The cosmetic result of the new care is not perfect," the doctor said, "but the hand function becomes really very normal. We have not completely solved all of the problems of scarring."

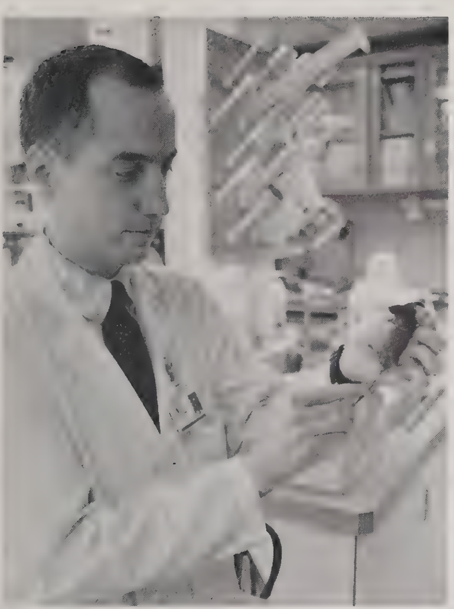
What does the future hold for burn therapy? Dr. Burke, who is also Helen Andrus Benedict Professor of Surgery at Harvard Medical School, sees an expanded role for artificial skin.

"The federal Food and Drug Administration [FDA] has not yet allowed us to use artificial skin for purely cosmetic purposes," he said, "but in treating acute burn injuries we notice continually that the best cosmetic results we get involve artificial skin—not conventional grafts with the patient's own skin.

"An impartial observer is presently interviewing patients who received artificial skin to seek their reaction. How does it feel? How does it look to them? We're encouraged by the responses thus far."

Can artificial skin benefit nonburn patients? Dr. Burke said the FDA may soon permit studies of the skin's effect in replacing areas of nonburn scarring and other cosmetic deformities.

"There's no reason to think that it won't work," he said. ■



Dr. Michael Wolohan examines the deformed hind leg of a laboratory mouse.

their own blood recruiting in the host.

Another orthopedic surgical resident, Dr. Edward Diao, later joined Dr. Zaleske in studying how and when embryonic cartilage cells begin dividing. In a transplantation, one does not shift just any block of cartilage tissue but only that portion which is destined to perform a specific function, such as building a knee joint.

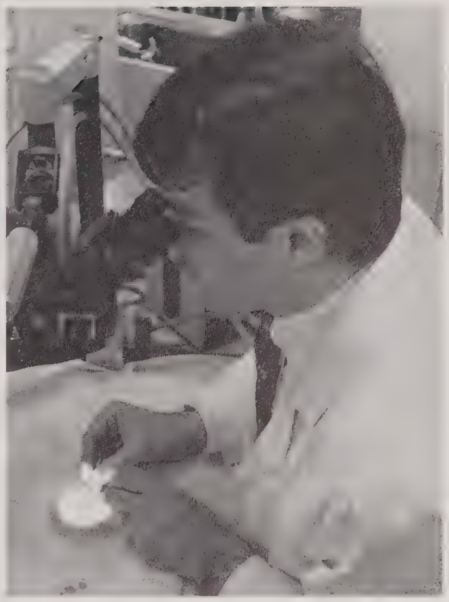
The two researchers discovered that while cartilage cells looked the same under a microscope just five days before the birth of a mouse, they were actually behaving differently. According to whatever bone or joint function they had, they already had their marching orders.

From this work, it became possible to select for transplantation blocks of tissue which would carry out a particular task.

If the technology could be perfected and applied to humans—a development that admittedly would be years hence—it would find a wide application in children.

"In addition to birth deformities, many instances of trauma affect the growing skeleton," said Dr. Zaleske, who is also Instructor in Orthopaedics at Harvard Medical School. "Growth tissue, for example, can very definitely be altered by severe burns. Better methods are needed in many situations to restore normal health."

How might one obtain donor cartilage to serve as a transplant? Dr. Holmes, a pediatrician, suggested an extension of present organ donor programs.



Dr. David Zaleske studies skeletal specimens from a mouse which had a leg defect.

"Children are born without kidneys or a brain and have no chance for survival," he said. "Possibly some parents of such children would have no objection to a donation of cartilage that could give another child a better head start in life." ■

The Struggle to Provide Third World Health Care

Why would a budding physician, soon to graduate from a premier medical school, give up precious class time to work at a remote, poorly equipped African hospital where patients arrive in dugout canoes?

A third-year MGH neurosurgical resident, who interrupted his studies at Harvard Medical School to serve for three months at the Albert Schweitzer Hospital at Lambarene, Gabon, had a ready answer.

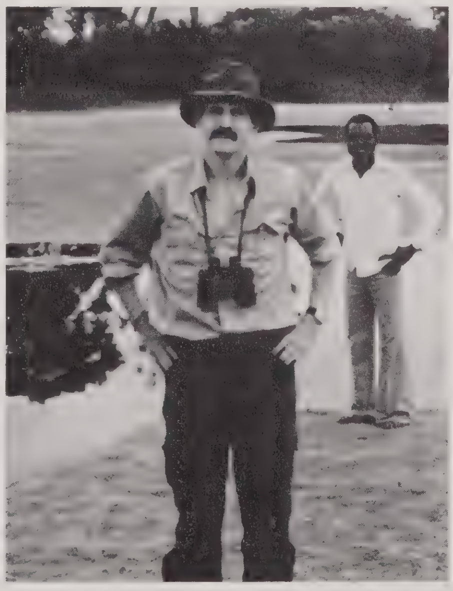
Dr. Allan J. Hamilton compared his situation with that of a pilot of a jumbo jetliner:

"Even with a pressurized cabin and all of the buttons, gauges, backup safety equipment, and other gear that he has, the pilot who truly loves flying wants something more . . . something that can be found only in a small, open plane, like a crop duster.

"He wants to put his head out of the cockpit and feel the wind blowing through his hair."

By traveling in 1981 to west central Africa under a fellowship from the Albert Schweitzer Foundation, the then Harvard student found what he was looking for, a chance to apply his medical education with himself in full control.

At the 240-bed jungle hospital built 74 years ago by the winner of the 1952 Nobel Peace Prize, Allan Hamilton received sole decision-making authority in caring for patients with a broad range of disorders. In fact, he arrived amid an outbreak of hepatitis that made some of the hospital staffers ill. "Docteur Alain," as he was called, suddenly found himself installed as Chief of Internal Medicine.



Dr. Allan Hamilton on a bank of the Ogowe River, a major transportation route in Gabon

Many challenges accompanied the autonomy that Dr. Hamilton sought. If instruments for a needed diagnostic procedure were unavailable, for example, he had to improvise.

At times, a patient arrived with an ulcer, and the doctor had to decide whether to recommend surgery. Back home, a patient would swallow some barium and, using a fluoroscope, a physician would follow the course of the contrast material to locate and evaluate the problem. But the Schweitzer Hospital had no such equipment, only a machine that produced plain X-ray films. Out of sheer necessity, Dr. Hamilton had to figure out how to manipulate that device in a way that could serve his needs.

Other Harvard medical students who became MGH residents also went to Lambarene. They were Drs. Stephanie J. London, now in a doctoral program at the Harvard School of Public Health; Marcia B. Goldberg, currently a Senior Resident

(Continued on Page 6)

The Albert Schweitzer Hospital at Lambarene, Gabon

Schweitzer Staff Faced Many Challenges

(Continued from Page 5)

at the MGH, and Robin K. Avery, a Junior Resident. They served in Gabon in 1982, 1983, and 1984, respectively.

All had a long interest in the delivery of health care in the developing world, and their experience at the Schweitzer Hospital provided them with a greater awareness of what is needed most.

"If one went to Lambarene and expected to find a perfectly running model of health care, one would be disappointed," Dr. Avery said. "But I learned as much from the problems there as from seeing what worked well."

Dr. Goldberg said that the vast majority of medical conditions she encountered responded well to relatively simple techniques and limited therapies, but that the key to good health in Africa seemed predicated on preventive medicine.

"The major needs in Gabon, and throughout Africa," she said, "are accessibility to clean water to help control parasitic infections, a better screening for tuberculosis, and a much more extensive vaccination program for children."

The Schweitzer Hospital, with only five to eight doctors at any one time, dealt with an enormous amount of parasitic disease, primarily malaria; as well as tuberculosis, hepatitis, pneumonias, skin ulcers, thyroid disease, particularly goiters that needed removal; and routine as well as improperly healed bone fractures.

Cardiomyopathy (deterioration of the heart muscle) and congestive heart failure, brought on by rampant hypertension in the Gabonese population, also kept the hospital staff busy, but digoxin and diuretics produced good results.

Drs. Hamilton, Goldberg, and Avery said they never encountered coronary artery disease. Since the Gabonese diet consists primarily of vegetables, atherosclerosis – the principal precursor of coronary artery disease – is rarely seen.

From its early days, the hospital has maintained a complex for leprosy patients and their families. Although most of the approximately 60 patients no longer have active disease, some require reconstructive plastic surgery to protect their fingers and feet.

Dr. Robin Avery checks a baby's weight during a physical examination.

Throughout the sprawling, one-story institution, families traditionally stay with patients, cooking for them at communal outdoor kitchens, attending to other personal needs, and giving assigned medications.

Since the illiteracy rate among the Gabonese is high, the staff draws sketches on patients' charts denoting a sun rising, a sun at noon, a sun setting, and a moon in the sky. One pill or half a pill is then indicated opposite the appropriate symbol.

Dr. Goldberg said that in an environment where resources are limited, the tradition of family assistance is very practical. It frees each nurse to take charge of many patients as her role becomes largely administrative.

Patients commonly arrive at the hospital after undergoing native remedies. Sometimes, tribal medicine men, called "fetisheurs," set up shop outside the hospital to sell their remedies.

"In that area of Gabon alone more than 400 plants are known to have active pharmacological properties," Dr. Hamilton said. "Sometimes I felt intimidated by the fetisheurs because they seemed at times to have more at their disposal than I did. The local herbs rarely interfered with the action of the medicines we prescribed."

The Schweitzer Hospital is so well respected in Gabon that people in need of medical attention will travel for days by boat or on foot to reach the compound, situated along the Ogowe River on the outskirts of Lambarene.

Lambarene has 20,000 inhabitants, but only a single dirt road links the community with Gabon's modern capital of Libreville on the Atlantic coast, 100 miles to the northwest. During the three-month wet season, the road is impassable.

To preserve fuel, the hospital produces electricity only 12 hours a day. Except for emergency surgery, the electric generator stays off the other 12 hours.

Dr. Avery said that despite its limitations the Schweitzer Hospital experiences a low rate of postoperative infections compared with hospitals elsewhere in Africa. She attributed this in part to the dedication of the Schweitzer staff to provide quality care. Also, the staff avoids surgery with high infection risk.

The hospital plays an active and continually expanding role, however, in a government-run outreach program called Protection of Mothers and Infants (PMI). A medical crew goes out daily to conduct health clinics in outlying villages, mainly to weigh children, chart their growth, and keep track of vaccinations.

Since diarrhea among infants is a major

MGH Acts to Stay In the Front Lines Of Medical Care

A last look at "Temporary One," the first structure to come down as ground clearing began for the new MGH complex

Through much of its history, the MGH's climb to world preeminence in medicine has been accompanied by a struggle to raise funds for new buildings. The primary commitment has been and still is to patient care, often at a cost of lagging behind in the need for patient care facilities.

The current rebuilding program of the MGH is the hospital's response to the need to replace facilities that are too inadequate to be renovated. The result of this effort will be a modern high-technology medical center that will actually cost less to operate than the outdated facilities it will replace.

Construction has begun on a new core facility containing nearly 600 beds together with support services for the highest quality patient care. In order to build with the least disruption of patient care, the first of two towers will soon begin to rise in the heart of the MGH campus, in space vacated by the razing of a temporary laboratory building. Medical units from the Baker Building will be moved into the first tower when it is completed in the spring of 1990, and only then will the Baker be razed, making space for the second tower.

When the second tower is complete in the fall of 1992, units of the Vincent–Burnham and Phillips House will be moved in. The two towers will link up with the White and Bigelow Buildings, centralizing the hospital's patient beds, which will then number 977 (a reduction from the present 1,081 beds).

The last step will be to raze the Vincent–Burnham Building, making room for a new hospital entrance. The Phillips House will probably be renovated for administrative uses. For future generations, the two towers will very likely come to symbolize the MGH as the Bulfinch and White Buildings have done in the past.

Historically, the largest gifts toward building the MGH have come from bequests and trusts. Herbert P. Dane, Director of the Capital Campaign, underscored their importance to the MGH noting that gifts arranged many years in the past are helping to build the new inpatient towers.

Years before the MGH was founded, the first bequest in its behalf was written into his will by William Phillips in 1797. The bequest provided $5,000 "toward the building of a hospital" and was payable "as soon as they shall determine to begin the work."

Mr. Phillips' son and namesake, the Honorable William Phillips, who became Lieutenant Governor of Massachusetts as well as the first president of the Massachusetts General Hospital Corporation, later added $15,000, making their gift the largest response to the hospital's first public appeal for funds. A century later their support would be honored in the name given to the Phillips House, completed in 1917.

"In today's more sophisticated world," Mr. Dane said, "bequests and trusts are not only welcome but also provide important advantages to the giver. By setting up a charitable trust for the eventual benefit of the MGH, donors can continue to receive the income from their assets during their lifetime and can also choose an area of the new towers to be named in honor of anyone they wish to memorialize. Charitable bequests and trusts also reduce a donor's taxable estate."

David C. Crockett, Deputy to the MGH General Director and the hospital's first development officer, noted that bequests and trusts are important to the hospital no matter how long a time until they are received. Dr. William Sturgis Bigelow, one of three generations of doctors for whom the Bigelow Tower is named, left the residue of his estate in trust for five nieces.

Although he died in 1926, the MGH did not receive his bequest until 1975.

(Concluded on Page 8)

Underground testing must precede any above ground construction.

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problem, causing dehydration, the crew teaches mothers simple oral rehydration techniques. Mothers also receive general instruction on good nutritional habits.

Last month, Dr. Goldberg spent several weeks in Venezuela and Colombia, studying infectious diseases there. After her senior residency, Dr. Avery plans to take a year off to work overseas again.

As for Dr. Hamilton, he is currently assigned to the U.S. Army's Research and Development Command in Natick, Mass. He is studying the problem of brain swelling that occurs when people climb to high altitudes where oxygen is diminished. ■

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MGH Benefactors Ensure Quality Care

(Concluded from Page 7)

These ladies came from sturdy stock; the last two lived to be 104 and 102 years old. Nevertheless, Dr. Bigelow's bequest arrived just in time to complete the Bigelow Tower.

Substantive benefits also have sprung from rather unusual circumstances. Mr. Crockett told of a series of visits paid to the MGH Outpatient Department during the late 1950s by a Back Bay resident, Miss Elizabeth Tilton.

"She would sit for hours on one of the old benches and observe the patients coming and going," he said. "We didn't know it then, but she was trying to determine what disorder was the most common problem in the clinics. She finally decided that it was alcoholism."

When Miss Tilton died, the MGH learned that it had inherited nearly $1 million for research on the problem of alcoholism. Her bequest built the Tilton Building, now housing an acute psychiatric unit.

The decision to leave a bequest to the MGH is usually made after careful thought and planning, not precipitously as in the case of another significant bequest recalled by Mr. Crockett. Mrs. Henry G. Vaughan was a patient in the Phillips House in the late 1940s at a time when the MGH was in tough financial straits.

Mr. Crockett had released to the press a statement to the effect that if the community didn't come to its rescue, the hospital would have to curtail some of its services. Mrs. Vaughan read this statement in her morning paper. That very day she summoned her attorney to the Phillips House and changed her will to make the MGH the residual beneficiary of her estate, in addition to the $50,000 she had already provided as an outright bequest.

As she suffered from acute pulmonary tuberculosis, it was unfortunately not long until she died, leaving nearly $1,250,000 to the MGH. Her bequest could not have arrived at a more opportune time.

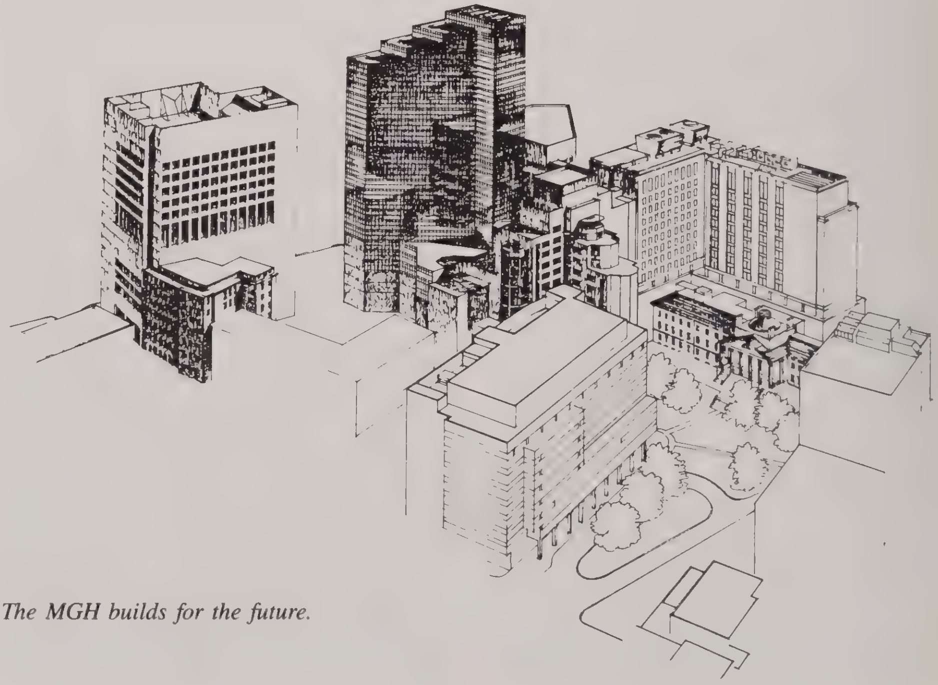
"Many people give to the MGH because of some association with it," said William E. Walch, Vice President for Resource Development and Public Affairs. "They may have worked here or been treated here, or they may have a relative or close friend who was cared for at this hospital. But people also give simply because they want to contribute to the premier medical institution in America and feel that the MGH is it. What better way to ensure excellence in medicine!"

Almost everyone who cares about the MGH could leave a bequest, said Mr. Dane, the Capital Campaign Director. "No bequest is ever too small," he said. "Many people who cannot afford to part with their assets during their lifetime receive enormous satisfaction from being able to give to the MGH through their wills.

"The bequests the hospital is receiving today are the result of decisions made many years ago; the decisions made today will be equally important to the MGH in future years."

Dr. J. Robert Buchanan, the MGH's General Director, stressed that "our commitment has always been to the quality of what we offer the people who come to us. We cannot always cure. But we do always reach out with a caring and comforting hand to those in a time of distress. Since 1811, American society and beyond that the world have been the benefactors of that commitment.

"But, if all of you who have come to believe in and love the MGH are to find the institution you expect it to be in the future, our Capital Campaign must succeed." ■



The MGH builds for the future.

MGH
News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 46 No. 4 May 1987

Specialists Combine Skills to Tackle Brain Tumors

Dr. Rita Linggood of radiation medicine examines a patient in the Brain Tumor Center.

A veil of mystery which has shrouded certain diseases of the nervous system, defying medical intervention, has finally begun to lift.

As a result of remarkable strides in surgery, radiation medicine, chemotherapy, and research within just the past few years, the outlook has improved for many patients with serious tumors of the brain, spinal cord, and nerves.

To come to grips with the challenges confronting them, however, specialists are moving to approach such tumor problems in a more coordinated, multidisciplinary fashion.

At the MGH, the gap was closed in early March with the establishment of an ambulatory Brain Tumor Center on the first floor of the Cox Building.

Among members of the center are Drs. Robert G. Ojemann and Robert L. Martuza, of neurosurgery; Dr. Paul H. Chapman, a pediatric and adult neurosurgeon; Dr. David Smith, of adult oncology; Dr. Cynthia Kretschmar, a pediatric oncologist; Drs. Fred H. Hochberg and Amy A. Pruitt, of neurology; Drs. Rita M. Linggood and Mary Austin Seymour, of radiation medicine; Inta Berzins and Carol Ghiloni, staff nurses; and Jane Calhoun, of social service.

By working together, not only can the team better evaluate the needs of tumor patients and formulate treatment, bringing to the fore techniques just developed, but the health professionals can also more easily keep each other abreast of overall developments in the field.

The center's visiting hours are from 9 a.m. until noon on Tuesdays. During an initial visit, patients—adults or children—can be examined by a number of specialists for a single fee. At the conclusion of the visiting hours, the staff convenes to review the status of patients seen

(Continued on Page 4)

Nursing Faces Battle To Maintain Flow Of Top Talent

Young women seeking an education pointing toward a professional career have traditionally looked at teaching and nursing.

But times have changed and so have customs, due in part to the women's liberation movement.

In the past two decades, because of shifts in attitudes and values among female students entering college, the number of women later turning to business as a career has skyrocketed 500 percent.

Even in medicine, four-year colleges are reporting more freshmen women seeking to become physicians rather than nurses.

The American Association of Colleges of Nursing has reported a 12.6 percent drop over the past year in the number of nursing students enrolled full time in four-year colleges.

Although it has taken its share of knocks, the teaching profession is beginning to regain its former attractiveness. But nursing clearly faces a stiff uphill battle.

The U.S. Department of Health and Human Services predicts that within the next three years the number of nurses holding jobs that require bachelor's degrees will be some 390,000 below normal.

"By the same token, the department is talking about a surplus of nurses who are prepared without the bachelor's degree," said Elizabeth M. Grady, Ph.D., in a talk to a large gathering of MGH nurses. "This means some kind of imbalance which will not properly address the nursing needs of people in the year 1990.

"Given the increasing sophistication and demands of our profession, it is felt that by the year 2000 we will probably have only about half the number of nurses we need prepared at the bachelor's level."

Dr. Grady, Director of the Graduate Program in Nursing at the MGH's Institute of Health Professions, said a number of nursing schools are facing a possible shutdown as a result of insufficient enrollment. Earlier this year, Boston University's School of Nursing, which has an enrollment of 350 students, announced plans to close the 46-year-old school.

"It is not uncommon," Dr. Grady said, "to hear of a school which once enrolled 60 students now having only about 9 applicants for the coming year."

(Continued on Page 2)

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EDITORIAL:

The Ultimate Irony

Nursing has long attracted candidates with a strong public service orientation. Now the profession is coming on hard times. As an article in this issue demonstrates, the nation is verging on a severe shortage of nurses.

Nor is nursing unique. Anyone who has tried to hire a secretary or someone in other occupations long dominated by women is acutely aware of this fact.

The reasons for the nursing shortage are many. Insofar as one rationale might explain in part the problems in several occupations in which women predominate, there is at least one common denominator: women's liberation. That movement has opened up to women male-dominated professions, like being a physician. Finally, at the same time many in women's liberation have denigrated the traditional roles of women. And that is sad.

Florence Nightingale and the "glamor" of the Crimean war beatified nursing. As long as women had few other options, they continued to swell the ranks of the profession. For many decades nurses swept floors, emptied bedpans, changed soiled sheets, and carried out a number of such duties along with providing compassionate care. In addition, they uncomplainingly accepted the orders, sometimes the male chauvinism of physicians.

Now nurses are infinitely better educated than ever before. In many if not most hospitals their roles primarily center on providing true professional care. They often are the first members of the patient care team to observe an ominous change in the condition of the sick. Countless patients owe their lives to their nurse.

In short, nursing has become a profession. It is ironic that at the very moment nursing has emerged from its humble but proud origins its very existence is threatened.

Nursing

(Continued from Page 1)

Mrs. Yvonne L. Munn, Associate General Director and Director of Nursing at the MGH, told her department that while much concern has been expressed about dwindling nursing school enrollments, current staffing vacancies at the MGH do not reflect a serious problem at this moment.

She said a study conducted last December by the American Organization of Nurse Executives showed a 13.6 percent shortage of nurses nationwide, but the vacancy rate in Massachusetts, according to a study by the Massachusetts Hospital Association, was only 9 percent.

"We had 105 openings, compared to between 80 and 90 in previous years," Mrs. Munn said. "But even 105 represented only eight and a half percent of our total positions."

She pointed out that hospitals with more than 500 beds, such as the MGH, normally report a higher percent of vacancies than smaller medical institutions.

Mrs. Munn said she found it interesting that the statewide study also reported the numbers of some allied health workers were down: pharmacists, 22 percent; physical therapists, 15 percent; and X-ray technicians, 12 percent. These shortages, she said, can also have a major impact on nurses and their workload.

Mrs. Munn said the very definition of shortage is subject to individual interpretation. While the overall job vacancy rate may be tolerable, the distribution of the vacancies can lead to severe shortages in some specific areas.

"When an evening nurse stays over for a night shift because her replacement was not able to make it in, and there was no alternative, that too is a definition of shortage," Mrs. Munn declared.

In addition, nurses at some institutions are being called upon today to undertake the duties of other health care providers. Mrs. Munn cited respiratory care as one example.

"In many areas of the country, for reasons of inadequate supply or redefinition of need," she said, "functions of respiratory care are ascribed as part of nursing practice."

Dr. Grady pointed out that settings

Photographs: Pages 1, 4, 5, 6, Myron Daniels; p. 3 (upper), Morse Photography; pp. 3 (lower), 8, Scott Davis; p. 7, courtesy of Dr. Richard Gange

other than hospitals are contributing to the shortage by vying for the services of nurses.

"Think about wellness centers, HMOs [health maintenance organizations], risk management enterprises, home health care agencies, and hospices," she said. "Our consumer populations are demanding all kinds of services with which nurses heretofore have not been involved."

Dr. Grady applauded the women's movement because it has led to better self-esteem among women in general.

"If we can talk with people and educate them to the challenges and rewards of our profession, then I think we can expect people to come into nursing more committed to making it a career.

"I think that the potential is great that we can recruit more mature people, people who have their act together, so to speak, and we won't have to be rushing, as some hospitals are, to foreign countries to find nurses."

Dr. Grady said recruiters must not overlook young future prospects and added, "I think that perhaps high school is too close. We need to talk to the 12-, 13-, and 14-year-olds.

"Their minds are still open to what they might want to do later. They don't yet have a good grasp of what nursing is, and what it could mean for them."

Dr. Grady decried the demeaning portrayal of nurses on many television programs and in novels. "We put up with such passivity," she declared, "and I think that that has had a whole lot to do with our past lack of self-esteem."

Professional nurses such as Susan Dial, RN, shown with Elizabeth Papanicolau, a surgical patient from Greece, are able to develop close relationships with people in their care.

She called for increased support of each other in the profession. "We also need to be drawing toward us, not alienating, our other health care professionals, persons with whom we bump shoulders every day in the health care arena," she said. "They need to understand better what we're about. I think we can see through this crisis and see it as an opportunity."

Dr. Elizabeth Grady of the MGH Institute of Health Professions addresses hospital nurses on the nation's nursing shortage. Seated are Mrs. Yvonne Munn, left, Associate MGH General Director and Director of Nursing, who also spoke, and Dr. Sylvia Paige of the MGH Institute, who introduced the speakers.

As new models of nursing evolve and locations of practice shift, particularly in the acute care setting, the need arises once again to define the scope of the nurse's role in patient care. "Who does what for the patient?" Mrs. Munn asked. "And how much substitution practice is tolerable?"

She also emphasized the need to readdress the question of credentials for the nursing profession. The basic entry requirements for the practice of nursing are changing. Through legislative activity, mechanisms will be in place in most, if not all, states by 1995 for state boards of nursing to provide separate examinations for the Associate or Technical Nurse, and for the Professional Nurse.

"What we have at the current time in the country," Mrs. Munn stated, "is a ratio of one in four or five of the new graduates prepared at the baccalaureate level. Therefore, as we examine new models of delivery in the acute care setting, we are presented with new opportunities to be very creative in differentiating who does what for the patient."

She reiterated the need for creative restructuring of the nursing delivery systems to allow for clear differentiation in practice of the technical and professional staff. At the same time, with fewer nurses available in the future, the scope of the nurse's responsibility for the total care needs of patients will need to be addressed. ■

Dr. Robert Martuza of neurosurgery studies a CT (computed tomography) scan of a tumor patient.

New Techniques to Treat Certain Tumors

(Continued from Page 1)

to date and to discuss future patients being referred to the center by other physicians.

Despite its name, the Brain Tumor Center concerns itself with all tumors of the nervous system. Dealing with conditions that most laymen probably never heard of, the center's staff decided on a name to which most people could relate. Besides, of all nervous system tumors, the largest number reside in the brain.

The most common tumors – and among the most difficult to treat – are the malignant astrocytomas, also called malignant gliomas or glioblastomas. From the time of diagnosis, survival has been about one year, sometimes two or three years if the patient were young and otherwise in good health.

What are gliomas? Think of nerves as electric wires criss-crossing the brain, the network held together by insulators. In the nervous system, these insulators are glial cells (glia, from the Greek word meaning glue). It is commonly on the glial cells that tumors form.

Accounting for more than half of all intracranial tumors in adults, malignant astrocytomas or gliomas may be anywhere in the brain. They have resisted surgery and high doses of radiation.

Today, new treatments are being tried. "By injecting high doses of chemotherapeutic agents into the artery feeding the tumor, we have been able to increase the duration of life and improve the quality of life of some patients who have failed surgery and radiation therapy," said Dr. Hochberg.

"We have used two drugs more than any other [cisplatin and one of the nitrosoureas]. We've conducted about 700 infusions to date, giving us possibly the most experience in the world."

If a tumor is slow growing, it can remain unidentified in the brain for years, causing no symptoms or only minimal symptoms such as a headache or minor personality change. But when a tumor enlarges (some can grow to the size of an orange), symptoms may be a weakness in an arm or leg, a visual disturbance, or memory difficulties. The nature of the symptoms depends more on where the tumor is situated than how big it has grown.

Dr. Martuza said that a seizure could be the first tip-off of a tumor's presence, or, as sometimes occurs, pressure of the tumor may interfere with the flow of cerebrospinal fluid in the brain, causing the patient to become acutely ill and thus seek professional help.

To locate and determine the size of a tumor, Dr. Martuza said that diagnosticians routinely turn today to computed tomography (CT) or magnetic resonance imaging (MRI), but to ascertain the presence and extent of malignancy, a neurosurgeon must obtain some of the tumor tissue for laboratory study.

With the use of a stereotactic technique (which allows precise localization), he said, biopsies have become safer than ever before. Coordinates provided by computer enable the surgeon to pinpoint the tumor as easily as he would locate a town on a map. Sometimes, instead of taking just a small amount of tissue, the surgeon will perform a full-scale operation (craniotomy), removing as much of the growth as possible. This would be followed by radiation therapy, and now by chemotherapy as well.

Meningiomas, which develop in the membranes or coverings of the brain, follow malignant astrocytomas in frequency among adults, accounting for 20 percent of all tumors in the nervous system. Meningiomas are usually benign.

Other less frequent tumors include acoustic neuromas that grow on a hearing nerve, medulloblastomas which develop in the coordination center of the brain, tumors that appear around the pineal gland in the midbrain, and neurofibromas which form on nerves from so-called Schwann cells.

When a neurofibromatosis patient came to Dr. Martuza with a tumor that was pressing on the spinal cord, threatening paralysis, the doctor used a carbon dioxide (CO2) laser to destroy the growth (*MGH News,* June–August 1983). The laser and a newer instrument, the ultrasonic aspirator, have also proved valuable in removing some meningiomas and other tumors.

Medulloblastomas and pineal-area tumors, which often arise in children, are highly responsive to radiation and drugs.

"The surgeon is sometimes unable to excise a tumor with invasive characteristics without causing neurologic deficits," said Dr. Linggood, of radiation medicine. "Radiation works by interfering with the dividing mechanism of the malignant cell. Using that therapy, we can frequently limit the growth potential of tumors and with time we may also see reduction in tumor size."

Since malignant cells are interwoven with normal cells in the nervous system, the extent of radiation must be that which the normal tissue can tolerate.

Dr. Linggood said two new techniques have been devised which may be helpful. One approach calls for implanting radioisotopes the size of small beads within a tumor to provide localized radiation. The second approach substitutes two or three smaller fractions of radiation for one single daily treatment. In this way, while normal tissue tolerance is respected and repair facilitated, the tumor itself receives a higher dose of radiation more rapidly, a benefit in rapidly growing tumors particularly.

The Feet Carry a Heavy Burden

Next to the common cold and tooth decay, Americans complain most about their feet.

At one time or other, more than 85 percent of the country's residents develop a foot ailment requiring professional care. This is readily understandable when one considers:

That two feet have a total of 52 bones—equal to one quarter of all the bones in the human body—plus 66 joints, 62 muscles, and more than 200 ligaments,

That with each step approximately three times a person's body weight is transmitted to the ball of each foot,

And that a pair of feet carries the average American 115,000 miles during a lifetime, or more than four times around the world.

No wonder patients at the MGH Podiatric Unit in the Wang Ambulatory Care Center (ACC) and at the hospital's satellite health centers in Chelsea, Revere, and Charlestown frequently comment, "When your feet hurt, you hurt all over."

With the increased popularity of sports that call for special footwear, e.g. tennis, jogging, and aerobics, more and more people are recognizing the importance of professional foot care. The long-time practice of "bathroom surgery"—taking a sharp instrument and excising an ingrown nail, a corn, or a callus—is fading as an unacceptable risk.

"Inappropriate self-care of that nature could result in a serious infection," said Dr. Robert J. Scardina, Chief of the Podiatric Unit, a part of the MGH Orthopaedic Surgery Service.

When Dr. Scardina came to the MGH in 1980, the unit occupied an obscure basement suite and offered one session a week of patient care, primarily palliative

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Dr. Chapman of pediatric neurosurgery sees the high sensitivity of medulloblastomas to radiation and chemotherapy as a "bright spot on the horizon."

"By looking at such a sensitive tumor, which is relatively common in youngsters, and seeing how radiation and chemotherapy affect it," he said, "we might be unlocking the door to types of treatment for other tumors as well."

Very young children with tumors that resist complete surgical removal stand to benefit greatly from advances in chemotherapy. Since their developing brains may be too sensitive to undergo radiation, these youngsters now appear to have an effective treatment alternative.

One of the problems posed by medulloblastomas and pineal-area tumors, as well as by a tumor called an ependymoma, is that their cells tend to spread into the cerebrospinal fluid and take hold at other nervous system sites.

"A tremendous amount of work needs to be done in a highly coordinated way," Dr. Chapman said, "to find out how to cure these tumors instead of just knocking them down temporarily."

Studies abound on the research front, including investigations to learn the origin of nervous system tumors. Researchers have known for some years that a connection exists between meningiomas and chromosome 22. Last August, an MGH team consisting of Drs. Bernd R. Seizinger, James F. Gusella, and Martuza reported in the British scientific journal *Nature* that acoustic neuromas are specifically associated with a loss of genes on chromosome 22.

In Dr. Martuza's laboratory, investigators are trying to evaluate phototherapy as an anti-tumor weapon. The studies involve the use of photoactive compounds that can be stimulated by a laser to kill tumor cells.

Dr. Hochberg said that the MGH has also used mechanical pumps to treat tumors that invade the coverings of the brain and spinal cord. The external pumps inject chemotherapy into the spinal fluid circulation as a means of providing medicine for the constant treatment of the tumor cells.

Several MGH physicians are testing drugs on tumors taken out of patients and grown in the laboratory. By trying out a variety of chemotherapeutic agents, the researchers hope to discover new ways of treating the tumors with medicines not previously used for that purpose.

In one of the MGH neurology laboratories, Dr. Rifaat Bashir is examining the relationship between a lymphoma tumor of the brain and Epstein-Barr virus. The study might indicate a role for antiviral therapy against the growth.

Before 1973, the MGH encountered this tumor only once every two years, but now, as an infection sometimes arising in patients with AIDS, it is being diagnosed more often. Although Dr. Hochberg described the tumor as already treatable with certain sophisticated drugs, he predicted that within several years the tumor, unless checked, could become much more common.

Dr. Linggood of radiation medicine emphasized that the aims of the Brain Tumor Center are not only to extend the lives of patients but to make sure they enjoy quality lives.

"Patients with these difficult diseases have a tremendous burden," she said. "The quality of life is something we need to address every day." ■

Dr. Fred Hochberg of neurology, at right, discusses a tumor patient's treatment with, from left, Dr. Rifaat Bashir, also of neurology, and Dr. Howard Fingert of surgical oncology.

Podiatric Unit Expands Foot Service

(Continued from Page 5)

treatment of chronic foot ailments.

Today, situated in a prominent area of the Wang ACC, which opened in 1981, the Podiatric Unit records more than 10,000 office visits annually and provides inpatient consultations wherever needed in the hospital, its affiliated Spaulding Rehabilitation Hospital, and neighboring Massachusetts Eye and Ear Infirmary.

The unit, which only last month moved to larger quarters at the MGH, now offers patient care twice a day from Monday through Friday, on Saturday morning, two evenings a week, and holds two or more sessions per week in each affiliated health center. On Thursday afternoons, an outpatient clinic is also conducted at the Spaulding Hospital for paralyzed, amputee, or otherwise handicapped patients.

In the Wang ACC, Dr. Scardina directs seven professionals, three of them board-certified or board-eligible in Podiatric Surgery and four board-certified or board-eligible in Podiatric Orthopaedics. Three additional members of the unit serve exclusively at the health centers.

Beginning July 1, the Podiatric Unit will commence formal training programs for both a Resident and a Fellow. The Resident, a graduate of the Pennsylvania College of Podiatric Medicine, will also rotate through other services in the hospital. The Fellowship program will have special emphasis on podiatric biomechanics (studying the foot as a mechanical component in conjunction with the biology of motion).

Among the most common conditions seen in the Podiatric Unit are:

Hammer toe deformities, a curling of toes which can result from a shoe being too short or a foot having too high or too low an arch; corns and calluses, buildups of dead skin due to friction or pressure against the foot; bunions, swellings on the side of the big toes, often the result of rheumatoid arthritis or ill-fitting footwear; ingrown toenails, caused sometimes by improper cutting; malalignment of the foot, causing symptoms in the foot or in the leg; painful pressure on the ball of the foot (metatarsalgia); flat feet, and heel pain.

Unit members who have surgical privileges operate primarily in the hospital's Surgical Day Care Unit. Reconstructive operations largely involve the middle or forward parts of the foot. Posttraumatic, congenital, and other complex rearfoot and ankle conditions are commonly referred to orthopedists but often require care from podiatrists as well.

Dr. Scardina emphasized that "our relationship with orthopedists is complementary and not competitive. The MGH's 'Problem Foot Program' routinely brings a joint effort of the two specialties on behalf of the patient."

Patients with systemic conditions such as diabetes, rheumatoid arthritis, and peripheral vascular disease, which can all have important manifestations in the feet, account for a sizable percentage of visits to the Podiatric Unit.

Dr. Robert Scardina prepares an orthotic device for Valerie Dana in the MGH Podiatric Unit.

"After a patient has had diabetes for some time, compromised foot circulation or sensation commonly occurs," Dr. Scardina said. "By providing care on a regular basis, we can hopefully effect early detection and/or prevention of serious complications such as ulceration, infection, and gangrene. If insensitivity is the problem, we can design an orthosis [shoe insert] that will properly protect susceptible or high-pressure areas on the sole of the foot."

As with diabetics, patients whose immunity has been compromised by drugs to prevent rejection of a transplant must be watchful against infection. An ingrown toenail, friction blister, or pressure ulceration that has gone untreated is a typical cause of infection.

Dr. Scardina estimates that more than half of his unit's patients return every few months for ongoing treatment or management.

The staff podiatrists commonly encounter problems related to sports medicine (running and jogging in particular), but Dr. Scardina described today's runners as much more sophisticated than those of 5 or 10 years ago.

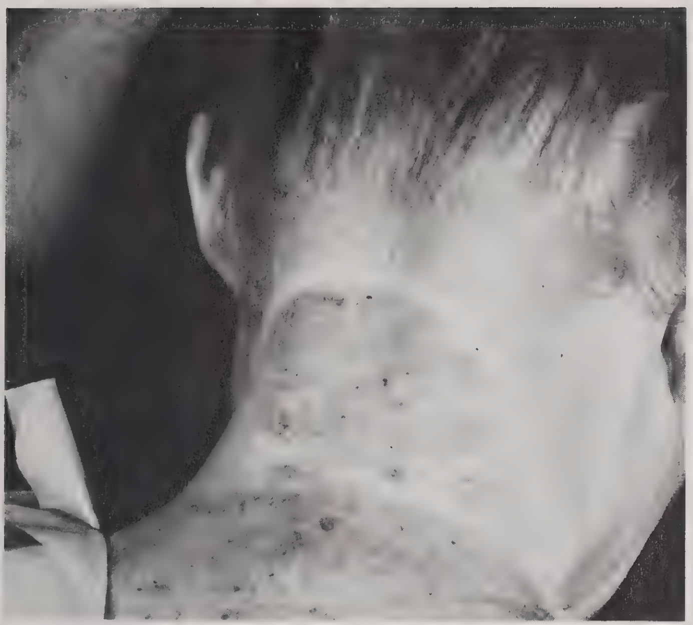
"Joggers in years past commonly wore tennis shoes instead of appropriate jogging shoes," he said. "They often ran on the wrong surface or terrain, didn't do stretching exercises before and after each workout, and didn't set realistic running goals.

"Today, they wear the right shoes, pay attention to the type of surface they run on, follow a proper stretching routine, and make use of the numerous self-help publications that are available. Consequently, we see less of the 'weekend runner' and more of the serious athletes, such as individuals involved in competition."

The more serious runner with a problem, Dr. Scardina said, requires a thorough biomechanical examination of the foot and lower leg, combined with a gait analysis. "We then correlate that data with the clinical symptoms and arrive at a suitable mechanical treatment," he said. "Most commonly we will devise a foot orthosis which will correct a dynamic malalignment in the foot."

The device might be constructed of soft, flexible materials or very firm materials depending on the needs of the foot. The Podiatric Unit operates an orthotic laboratory at the MGH's Chelsea Memorial Health Center.

By assessing the structure and movement of a person's foot, podiatrists can usually determine if the patient would be



The skin change on this woman's neck resulted from interaction of the sun's rays with a medication she was taking.

Why Some People Avoid the Sun's Rays

For countless Americans, the return of spring and warm weather has special significance.

Equating sun exposure with good health and a better appearance, they hustle outdoors at the earliest opportunity to bask in the sun and get a start on what will be a glorious tan lasting through the summer.

For some other individuals, the sun's rays do no favors. In these people, the rays can set off a variety of disorders that may leave the skin with rashes, redness, swelling, pimples, blisters, patchy areas, or spots, and cause itching as well.

Up to 10 percent of the population under age 30 are believed to react abnormally to sunlight. Susceptibility to sunburn has little to do with the disorders since dark-skinned as well as fair-complexioned people may be stricken. Rather than burning, it is more a case of sun poisoning.

Most common among the illnesses triggered by the sun is a syndrome (group of signs or symptoms) called polymorphous light eruption (PMLE).

Some patients may seem perfectly healthy when they go into the sunlight. But several hours later, abnormal responses begin to appear. The expressions are variable: small, itchy bumps; bite-like lesions, fluid-filled blisters, or large red patches, to mention a few.

If exposure is repeated over several days, the responses will build in intensity. However, as the summer progresses, about a third of the patients will usually develop a tolerance that lessens the severity of the reaction.

Certain Indian tribes in North and South America have a hereditary form of PMLE. Their disorder begins in childhood, affecting twice as many females as males. A positive family history can be traced in 75 percent of these patients.

In Australia, where a predominantly fair-skinned population is exposed throughout the year to higher levels of ultraviolet radiation than experienced in temperate zones, PMLE is rare.

Dr. Richard W. Gange, an MGH dermatologist, believes the population simply developed a tolerance to the solar rays. He said, "I see more skin sensitivity to the sun in Boston than I did in San Diego where I worked before. Unlike Boston, San Diego has summery weather year round. The people there adjust to it."

As Director of the Clinical Photobiology Laboratory in the MGH's Wellman Laboratories of Photomedicine, Dr. Gange heads a team studying how light affects the skin and how the skin can protect itself.

Some forms of PMLE can be ascribed to a combination of sun exposure and the taking of certain medicines. Dr. Gange said that thiazide diuretics, which help to lower blood pressure, are among the most common photosensitizing drugs. Tetracycline, sulfur drugs, and some oral antidiabetic medications can also create abnormal skin eruptions.

Ironically, psoralen, a drug used with ultraviolet-A light to treat difficult cases of psoriasis, can precipitate a phototoxic reaction. Dr. Gange told of a patient who developed skin problems on his hands after he hosted a cookout.

"During the affair, held in bright sunshine, the man busied himself making drinks for his guests, and he handled a number of limes," the doctor said. "Psoralen is found in the skin of limes, and the patient wound up with a high concentration of the substance on his hands. Activated by the sunlight, the psoralen led to large blisters."

When given as PUVA (psoralen plus UVA) treatment, a technique developed

(Concluded on Page 8)

a good candidate to pursue an activity which requires running. Running differs from other sports in at least one respect. The steps are repetitive and nearly identical with the force upon the joints magnified, creating "overuse" problems. In other sports, the same exact step is seldom repeated consistently.

Dr. Scardina said twice as many women patients as men visit his unit, and that, more often than not, poorly fitted or styled shoes contribute to the problems.

"Individuals inherit a basic foot structure," Dr. Scardina said. "Once the bony segments are fully matured, the foot's shape is fixed. If it is then put into the wrong 'container' or subjected to the wrong activity, deformities and symptoms usually develop.

"Women are slaves to fashion. They buy shoes primarily for appearance rather than comfort and protection. Thus, women contribute to the development of bunions, metatarsal pressure or nerve impingements on the ball of the foot, or hammer toes with corns or calluses."

Dr. Scardina offered these tips to the shoe customer:

- Make sure that new shoes are comfortable when first tried on. Don't count on breaking them in later.
- If one has very flexible feet that flatten out with weight-bearing, make sure the shoes are supportive.
- A person with high arches that tend to be rigid should look for some cushioning in the inner and/or outer soles.
- A shoe's heel counter (the cup-like structure at the back) should extend forward adequately along the sides to support the heel.
- The shoe's upper ideally should be made of soft leather, rather than synthetic materials.
- And since feet swell a bit during the day, the best time to shop for shoes is in the late afternoon or evening. ■

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Developing a Tolerance to the Sun

(Concluded from Page 7)

at the MGH, the drug is administered in precise amounts.

Frequently it is the treatment of choice for patients with severe PMLE. Dr. Gange said that PUVA induces considerable pigmentation and offers good resistance to the syndrome, but the therapy is reserved for difficult situations because the patient must visit the hospital three times a week and meet other treatment requirements. In addition, the treatment has a potential adverse side effect.

Sometimes, PMLE patients are urged to undergo a program of exposure to UV-B radiation before the start of the warm weather to build up a tolerance to the sun. Sometimes, certain antimalarial drugs, including Plaquenil, can help the sun-sensitive individual.

If skin eruptions occur and become very severe, physicans may prescribe steroids, such as prednisone, to bring them under control.

Ingredients in certain cosmetic preparations, such as lipsticks, and grooming products, such as after-shave lotions, have been blamed for dramatic skin reactions following exposure to the sun.

Sunscreen lotions and creams, particularly those containing PABA (para-aminobenzoic acid) generally offer effective protection against the sun, but for some people even ingredients in these products, including PABA, may provoke an allergic response. Avoiding offending chemicals is the best way to prevent further attacks.

In addition to the PMLE syndrome, the sun can activate a condition called solar urticaria, a form of hives. "This occurs with greater rapidity than the polymorphous light eruption syndrome and is a more transient phenomenon," said Dr. Gange, "but it can be very troublesome.

"Instead of individual bumps on the sun-exposed skin, solar urticaria may produce a red, sheet-like swelling across the entire area. The symptoms may fade within a few hours, but occasionally, if the attack is very severe, the skin may release a massive amount of histamine, causing breathing difficulties, even collapse of the patient."

Solar urticaria can recur day after day with repeated exposure to the sun.

Another skin condition involving the sun occurs in people with defective pigment cells in areas of their skin. The lack of pigmentation leads to white patches often aggravated by sunlight. In a fair-skinned individual, the disorder, called vitiligo, might go unnoticed during the winter, but during warm, sunny weather the white areas redden very rapidly, making them stand out.

If an individual with vitiligo readily tanned under the sun, the darkening of the skin around the white patches would have the same effect of making them more distinguishable.

Dr. Gange, who is also Associate Professor of Dermatology at Harvard Medical School, said PUVA treatments can help such patients, but he cautioned, "The patients have to be very motivated because we're talking about a year of treatment."

Before any treatment program can be prescribed for any patient suffering from a skin sensitivity disorder, blood tests, and sometimes skin biopsies (removal of a snippet of tissue for laboratory study), must be conducted to make certain that the problem is not a life-threatening one.

"Some major conditions manifest themselves by light sensitivity," Dr. Gange said. "A rash developing in a sun-exposed area of the body could, for instance, be an indication of lupus erythematosus, a connective tissue disease."

Lupus falls into two categories, discoid (chiefly skin), which is generally mild, and systemic (entire body). If uncontrolled, systemic lupus can affect vital organs. ■

Even before the season's greenery appears, MGH employees gather on the Bulfinch Building patio to soak up the sun.

MGH
News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 46 No. 5 June–August 1987

MGH Organizes a Major New Anticancer Offensive

Already the largest unit of its kind in New England, the MGH Cancer Center is about to grow some more—much more.

The hospital has embarked on a major expansion and strengthening of the center with one of the nation's leading physician–scientists named to head the ambitious undertaking.

In a newly created position as Director of the MGH Cancer Center, Dr. Kurt J. Isselbacher will not only coordinate cancer treatment, education, and research activities in the eight-story Cox Building but also research and other programs in satellite quarters now being developed at the nearby Charlestown Navy Yard.

Dr. William C. Wood, a surgical oncologist who has been in charge of the Cancer Center's patient care activities, will continue in that role as Clinical Director.

Chief of the MGH's Gastrointestinal (GI) Unit for the past 30 years and Mallinckrodt Professor of Medicine at Harvard Medical School, Dr. Isselbacher said the past decade has witnessed an explosion of cancer knowledge.

"The field of oncology has become increasingly big and complex," the internationally known physician said. "It is difficult for any one physician to be a specialist in all types of cancer. Each has become an in-depth entity requiring special knowledge and expertise."

Unlike medicine and surgery which stand like independent structures, Dr. Isselbacher said the cancer center must move in a framework of interdisciplinary teamwork, combining surgery, medicine, radiation therapy, immunotherapy, chemotherapy, pathology, etc., to fight cancer.

"The success, the excitement, the opportunities," he stressed, "are clearly based on interdepartmental collaboration and cooperation."

(Continued on Page 2)

Excess Iodine Increases Thyroid Illness

Thyroid disorders, which affect 10 million Americans, are showing signs of becoming more widespread. In part, this can be attributed to advances in diagnosis, but an increased consumption of iodine also appears to be responsible.

Iodine converts into thyroid hormone and regulates the function of the thyroid gland. While large amounts of the chemical have only a temporary effect on a normal gland, an excess of iodine can create problems in patients whose gland is abnormal.

Iodine has long been an ingredient in table salt and bread. It also serves as a preservative in a wide variety of canned vegetables.

The chemical can be found in many mouthwashes. Most multivitamins with minerals contain 150 micrograms of iodine. Almost any pill that is red probably has some iodine in it. In hospitals, the contrast materials for special X-ray procedures, such as filming blood vessels, utilize large quantitites of iodine.

A heart drug, Amiodarone, used mainly to prevent arrhythmias, contains a huge amount of iodine.

Dr. Gilbert H. Daniels, an MGH endocrinologist and member of the hospital's Thyroid Unit, said that "in Boston the daily intake of iodine used to range between 100 and 200 micrograms, but now totals between 600 and 800 micrograms."

The change in iodine consumption, he said, appears to have increased the prevalence of the most common cause of an underactive thyroid, an inflammation called Hashimoto's thyroiditis (*MGH News,* November 1981).

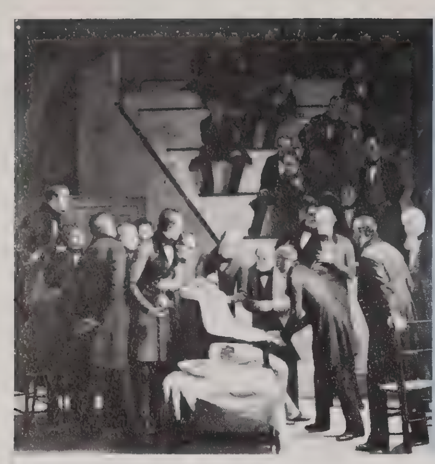
Dr. Daniels said that studies by Dr. Farahe Maloof, former Chief of the MGH Thyroid Unit, showed that patients with Hashimoto's thyroiditis are very sensitive to excess iodine.

"If patients with Hashimoto's and mild hypothyroidism are given excess iodine, profound thyroid hormone deficiency can occur," Dr. Daniels declared. "In this situation, the iodine prevents the thyroid gland from manufacturing and releasing thyroid hormone. Recent studies suggest that increasing iodine exposure can actually increase the number of patients with Hashimoto's thyroiditis."

Excess iodine is useful in certain other situations. Dr. Daniels said that since

(Continued on Page 4)

On Page 5, an MGH physician describes the history, culture, habits, and health of Gypsies.



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EDITORIAL:

An Incredible Undertaking

By leasing much of Building 149 in the Charlestown Navy Yard, the MGH is engaging in an incredible undertaking. It took this hospital 176 years to accumulate roughly 260,000 square feet of research space on its main campus. That main campus will have essentially no space for further construction when its two inpatient towers are complete about 1993. To add in one stroke of the pen the well over 300,000 square feet for research in Charlestown staggers the mind. But to do this two miles from mother MGH boggles the imagination.

Conventional wisdom has it that biomedical research is most effective when juxtaposed to patient care. To circumvent conventional wisdom, the MGH is doing two things: 1. Easing the transportation problem by using shuttle buses between the navy yard and the main campus and looking into the possibility of water transportation; 2. Selecting research projects that will blend well in the new satellite center. Careful choices will provide the interactive stimulation that makes scientists with similar interests more creative.

Timing is always critical. And there too the move seems auspicious. Never has biomedical science advanced so rapidly as in the past decade. Techniques like recombinant DNA and the use of monoclonal antibodies have burst into prominence. First MRI and to a degree PET have joined CT scans as major diagnostic tools. The laser is finally coming into its own. Immunology seems ready to join traditional modes of treatment.

It is immunology that will spur on one major area of research in Building 149. With its early but hopeful promise, immunotherapy may become a prominent way of attacking at least some forms of cancer. Partly with that in mind the hospital is taking a quantum leap in enlarging the MGH Cancer Center.

To ease the growing pains, Dr. J. Robert Buchanan, General Director, has recruited from within the MGH an investigator with an international reputation. Kurt Julius Isselbacher has won the awards and acclaims of a world-class scientist. Rather than rest on those laurels as many would have done, he has agreed to enlarge significantly the scope of the MGH Cancer Center. More important, he will seek the brightest minds to carry out in depth newly emerging areas of cancer research. At age 176, the MGH is alive and well.

Cancer Center

(Continued from Page 1)

Dr. Isselbacher cited three reasons for expanding the hospital's cancer research:

"First, advances in basic biology, especially molecular biology, immunology, and cell biology, have progressed so rapidly that we simply cannot afford to delay new study programs.

"Second, we can do much more for cancer patients now than we could ten years ago, but it is clear that more potential benefits lie ahead.

"And third, when the cancer picture was very discouraging, few investigators were willing to go into oncology. Today, many of our best Residents want to enter this field. They see the opportunities for contributions and advances."

One of Dr. Isselbacher's major tasks will be to recruit additional top-flight scientific talent for the center. He anticipates close to a 30 percent increase in personnel now that the availability of space in Charlestown has made expansion possible. Many of the new researchers are expected to be young scientists who already have excellent records of accomplishment and who can "come on board" as quickly as laboratory space is set aside for them. "The whole excitement is to create an even better intellectual scientific environment which in turn will improve patient care," Dr. Isselbacher said.

He also plans over a period of time to recruit some tenured faculty.

Theoretically, some research findings like those impacting on bone marrow transplantation might lead to immediate help for the patient. Researchers, Dr. Isselbacher said, have duplicated the genes for a number of growth factors so that they can be manufactured by molecular biology techniques. It will soon be possible for these to be given to patients to stimulate a production in the marrow of needed blood cells, thus enhancing the body's protective immune system.

Dr. Isselbacher said that being part of a general hospital gives the MGH Cancer Center a great advantage over some other cancer centers. If their patients develop major complications, such as a heart attack, they often need to be transferred to other appropriate institutions.

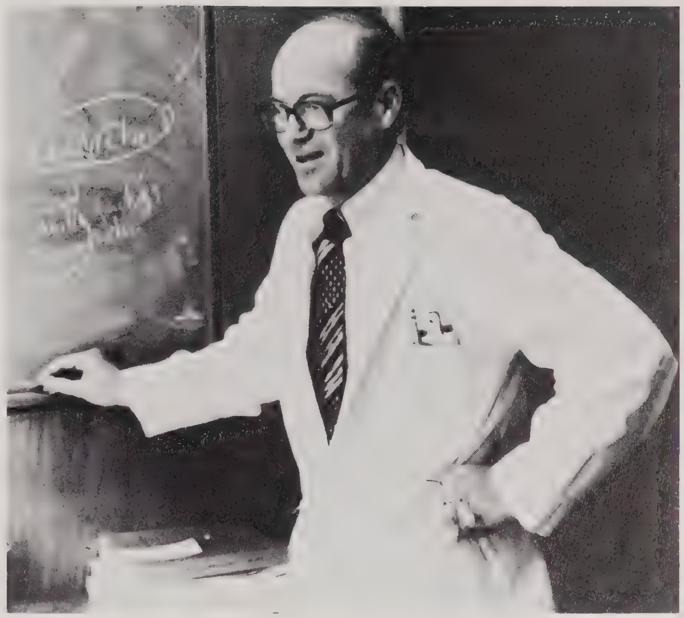
Photographs: Page 1, courtesy of National Geographic Society; p. 3, courtesy of Dr. Kurt Isselbacher; pp. 4 (upper), 7, 8, Myron Daniels; pp. 4 (lower), 5 (lower), courtesy of Dr. Lawrence Wood; pp. 5 (upper), 6, courtesy of Dr. James Thomas

"We have a tremendous opportunity," Dr. Isselbacher said. "It's the clinical excellence of the MGH combined with the expertise in so many specialized aspects of cancer diagnosis and treatment and now an additional basic science effort that will permit us to develop into one of this country's leading cancer centers. That's what we're aiming for."

Some of the work already expected to be transferred to the Cancer Center satellite includes immunotherapy of cancer patients employing an MGH-developed method for using the drug Interleukin-2 and a program in molecular gastroenterology dealing with cancers of the liver, pancreas, colon, and stomach. Dr. Isselbacher and his associates are currently carrying out studies on genetic pieces of DNA similar to oncogenes that may be involved in colon cancer.

Other studies may involve mice carrying genes that appear to predispose to the development of breast and other cancers to see how these disorders are passed on to offspring. Some external factors may be pulling the trigger, causing the growth to be expressed as a malignancy.

Dr. Isselbacher sees the need for a thorough study of the role of diet and nutrition in cancer. As Chairman of the Food and Nutrition Board of the National Academy of Sciences, he has commissioned an in-depth study on diet and health which should be completed next year.



Dr. Kurt J. Isselbacher, newly named Director of the MGH Cancer Center

An area presently under widespread study involves target-specific substances called monoclonal antibodies to localize and treat tumors. It is possible to put agents such as radioactive iodine on such antibodies to irradiate and try to dispose of the abnormal cells.

In molecular pharmacology, Dr. Isselbacher hopes to see the development of new, more effective, and less toxic drugs.

He also cited the possibility of setting up diagnostic screening and treatment clinics at the satellite facility. Screening programs, such as evaluating blood tests for cancer, could be conducted without need for a total hospital backup.

Dr. Isselbacher has compiled an impressive record of achievements in medicine, winning a number of national and international awards. In the cancer field, he conducted pioneering work in 1971 that helped to show that tumor cells develop a much more rapid uptake of nutrients, especially glucose, and leave surrounding cells deprived. "That's why cancer cells can grow at the expense of normal cells," he commented. Most recently he has carried out basic studies to emphasize the role of the immune system in removing and killing cancer cells.

A cum laude graduate of Harvard Medical School in 1950, Dr. Isselbacher was appointed Chief of the GI Unit at the MGH only seven years later at the age of 31.

In 1973, he became the first gastroenterologist in the nation to be elected to membership in the National Academy of Sciences. Just this year, the prestigious organization named him to three prominent positions (Councilor of the Academy, member of its Executive Committee, and member of the Governing Board of its National Research Council).

Dr. Isselbacher has served as President of the American Association for the Study of Liver Diseases, the Association of American Physicians, and the American Gastroenterological Association.

The author of 356 articles in scientific journals, he has also served as Editor-in-Chief of Harrison's *Principles of Internal Medicine,* a leading textbook used by internists and medical students. ■

Added Space Benefits Varied Research

The MGH's leasing of quarters at the historic Charlestown Navy Yard will permit a breadth of research opportunities unprecedented in the hospital's own rich history.

Most of the 334,000 square feet of space acquired at the navy yard will be used for investigations, not only of cancer but also of challenges in such fields as arthritis, diabetes, hematology, pulmonary medicine, kidney disease, neurology, and computer science.

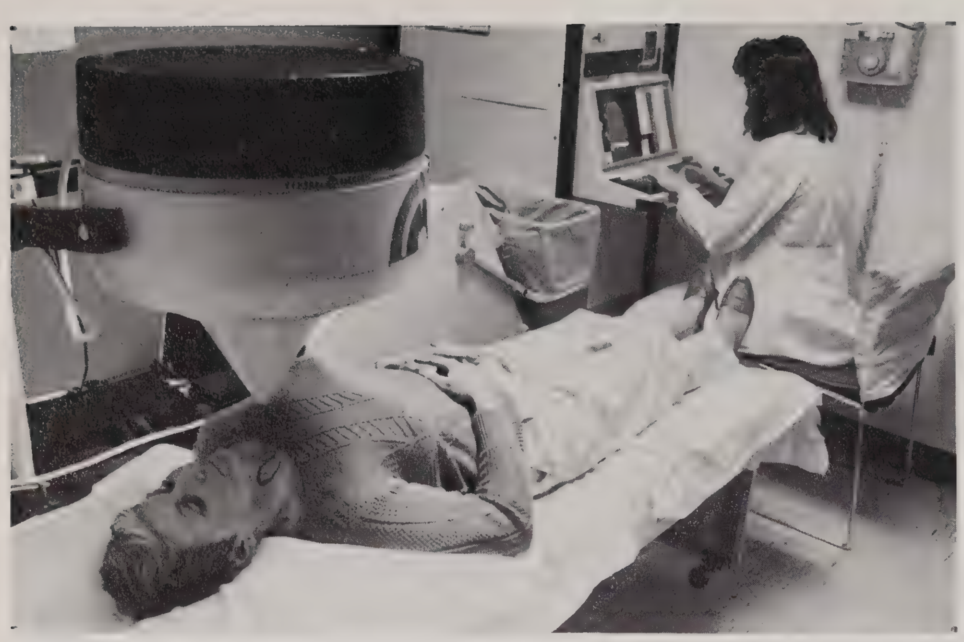
"This is a unique opportunity for the MGH to strengthen areas that are just emerging as the biomedical research of tomorrow," said Dr. J. Robert Buchanan, MGH General Director. "We can achieve this because in one leap we will have added more laboratory space than we have accumulated in 175 years."

On the hospital's main campus, research efforts to improve health care will continue in a congested area covering some 260,000 square feet.

Speaking at a news conference at the navy yard, attended by dignitaries, including Boston Mayor Raymond Flynn and Boston real estate developer Neil St. John Raymond, Dr. Buchanan said that "without Building 149 our research efforts would have stagnated."

The research laboratories which the MGH will open early next year not only will refuel the drive to conquer disease but Dr. Buchanan also said:

"The 70 million dollars of research funding we already have comes almost entirely from outside Massachusetts and flows into the state's economy. Because of the availability of this building, we expect to bring untold millions more into the Boston and Massachusetts economy." ■



A patient undergoes a diagnostic thyroid scan in the MGH's Thyroid Unit.

Many With Thyroid Defects Go Untreated

(Continued from Page 1)

iodine can block the production of thyroid hormone in patients with "damaged" thyroid glands, "we have used extra iodine in patients treated with radioactive iodine for an overactive thyroid gland. With this additional therapy, patients return to thyroid function more quickly than with radioactive iodine alone."

Weighing only a half ounce and resembling a bow tie, the thyroid gland straddles the windpipe at the base of the neck and controls the rate of chemical change (metabolism) in the body. When the gland produces too much hormone, body processes rev up, resulting in a fast heartbeat, nervousness, weight loss, etc. Conversely, when insufficient hormone is produced, a rundown, sluggish, and depressed feeling sets in.

The pituitary gland acts as a thermostat for the thyroid, trying to keep its hormonal output in balance. When a deficiency of thyroid hormone occurs, the pituitary dispatches a thyroid stimulating hormone (TSH), telling the thyroid to try to produce more.

An increase in TSH levels can produce a goiter (an enlargement of the thyroid gland). In some patients, such a growth is the first indication of something awry with the thyroid. In others, symptoms of too much or too little thyroid hormone may be indistinguishable from those of other disorders, such as a cardiac or psychiatric disease.

Dr. Lawrence C. Wood of the MGH Thyroid Unit said that of the estimated 10 million people in this country with thyroid conditions, about 2 million are not aware of it and thus are going untreated.

In a home reference book entitled, "Your Thyroid," which Dr. Wood coauthored with two former MGH colleagues, Drs. David S. Cooper, now of Sinai Hospital in Baltimore, and E. Chester Ridgway, of the University of Colorado, the physicians wrote that even among patients who know they have a thyroid problem, many are taking too much or too little medication and need to be retested for adjustment of their treatment.

Indeed, recent formulations of some thyroid hormone preparations are much more potent than those previously manufactured.

A patient with a goiter, an enlarged thyroid gland. Of the many possible causes of a goiter, cancer is the least common.

Over the years, blood tests to determine whether a gland is overactive (hyperthyroid) or underactive (hypothyroid) have become increasingly sophisticated.

Since normal thyroid hormone concentrations vary from one person to another, measurements of TSH can indicate whether the pituitary considers certain thyroid hormone levels to be too low or too high. If the glandular function is too low, the TSH will be high. If the thyroid's activity is excessive, the TSH will be either very low or absent.

Sometimes TSH tests lack sufficient sensitivity to differentiate between normal and low or absent. Scientists recently developed a new test, however, which appears to have solved the problem.

Called TSH–IRMA (immuno radiometric assay), the technique is ten times more sensitive than previous methods of measuring tiny amounts of TSH in the blood and can turn out the results much faster.

Writing in a newsletter of the Thyroid Foundation of America, Inc., an MGH based organization established to disseminate information about the thyroid gland, Dr. Douglas S. Ross predicted that "as the TSH–IRMA assay becomes widely available, it may become the best single screening test for thyroid dysfunction."

The new assay might not be useful for very sick patients since some of the medications given to them, such as cortisone and dopamine, can lower TSH.

Researchers have discovered that Graves' disease – the most common form of hyperthyroidism – is caused by an antibody that stimulates the thyroid to overproduce hormone. In the last 6 or 7 years, several techniques have been developed to measure those antibodies.

Such tests can be very important. In pregnant women treated in the past for Graves' disease, for instance, the continued presence of an abundance of the antibody might portend an overactive thyroid in the new offspring.

While blood tests indicate whether a person's thyroid is overactive or underactive, they do nothing to evaluate or describe structural abnormalities of the gland, such as goiters or lumps.

A goiter may stem from a number of conditions, but if the patient lives in the United States, the physician can rule out iodine deficiency in the diet. This problem no longer exists in America.

Thyroid hormone tablets to suppress the pituitary's release of TSH may enable

A Doctor's Observation of Gypsy Life

The staff of the intensive care unit sprang into action as a cardiac monitor signaled that the heart of a 48-year-old patient had stopped.

When it appeared evident that CPR (cardiopulmonary resuscitation) was not going to succeed, the team did a strange thing.

Even as the CPR continued, the doctors and nurses pushed the patient's bed out of the ICU and down the hall into a non-patient room. A window was quickly thrown open, and a dark-skinned man lit a candle under the bed.

A few moments later, the patient, who had suffered several previous heart attacks and strokes, was pronounced dead.

Members of his family were allowed into the room. With loud wailing, they unleashed their emotions. Just 15 minutes later, quiet returned as the family filed out to go home and arrange for the funeral.

Dr. James Thomas, then a Senior Resident, explained the unusual events that took place during the final minutes of the patient's life.

"The man, whom I had treated on a number of occasions, was a Gypsy," he said. "Our actions conformed to the spiritual customs of his race.

"In the past, a Gypsy traditionally died outdoors. Today, Gypsy custom allows a person to die indoors provided the individual is lying next to an open window. The flame of the candle is supposed to light the way for the Gypsy's soul to go to heaven."

The candle could not have been lit in the ICU because oxygen was in use there and might have ignited.

Now three years later a Clinical and Research Fellow in Cardiology, Dr. Thomas recently discussed the history, culture, habits, and health of Gypsies in a talk to MGH Residents. The talk was based on his close relationship with and professional care of some 60 Gypsies during his own three-year medical residency at the MGH.

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ELA FALA PORTUGUES
ELLA HABLA ESPANOL

Gypsy women commonly derive income as fortune tellers.

"Contrary to the belief of many, Gypsies are not just any group of vagabonds

(Continued on Page 6)

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the goiter to decrease in size. If hormone treatment fails, surgery can remove the growth.

Lumps in the thyroid are extremely common. Dr. Daniels said that in the past everyone who had a lumpy thyroid wound up getting surgery until it was recognized that the nodules were almost always benign.

He said, however, that some patients with lumpy or nodular thyroid glands can be at risk if exposed to excess iodine. The extra iodine would lead to excess thyroid hormone, a hyperthyroid condition that can result in serious heart and other difficulties.

Today, as part of the diagnosis, a patient may undergo a thyroid scan which would reveal the extent of a glandular disturbance or a fine needle or cutting needle biopsy whereby a needle inserted into the gland could withdraw cells or tissue for laboratory study. Usually, surgery can thus be avoided.

Dr. Daniels said that members of the MGH's Thyroid Unit handle between 4,000 and 5,000 patient visits a year but encounter only about 60 new patients with thyroid cancer. "It is a relatively benign cancer," he said, "but in people of advanced years it can be very aggressive."

A new test has been developed to detect a form of cancer called medullary carcinoma of the thyroid. Dr. Daniels said that since this cancer can run in families, screening studies of family members of patients found to have this unusual condition are indicated.

The doctor also said that lymphoma of the thyroid is increasing in frequency, possibly because of the increase of Hashimoto's thyroiditis. "The lymphoma, a growth which seems to start in the thyroid gland, is not a common disorder," he said, "but it has clearly turned up more than usual in the last five years."

Dr. Daniels, who is also Associate Professor of Medicine at Harvard Medical School, said people exposed in childhood to X-ray radiation of the throat or neck area or who are in families with a history of thyroid disease should notify their physician.

"These are populations of increased risk which should be checked more carefully," he said. "But in general anytime a person has vague complaints that are unclear as to origin, that individual should consider having a thyroid function test." ■

Sometimes what appears to be an enlargement of the entire thyroid gland turns out, instead, to be a lump or nodule within the gland. Most nodules are harmless.

Long in preparation, Gypsy feasts are traditionally lavish affairs.

The History of Gypsies Began in India

(Continued from Page 5)

or wanderers, but a race of people with a distinct history," the doctor said. "Current evidence indicates that they arose in the Punjab region of India about 1,000 years ago and later traveled westward through the Middle East, arriving in Europe around 1400. First seen in the Balkans, they rapidly spread through all of Europe. By 1500 they were sighted as far north as Sweden and Scotland."

Two facts have led to the conclusion that Gypsies originated in India. First, Gypsies worldwide speak an unwritten language called *Romani* which is quite similar in vocabulary and grammar to *Hindi*. Second, Gypsies have a blood type grouping predominantly similar to that common among the Punjab Indians and quite distinct from that of most Europeans and Americans.

Most forebears of the estimated half million Gypsies in the United States arrived in the last half of the 1800s, although a few came as early as colonial days.

Boston's Gypsy population numbers 2000 to 3000, admittedly a rough estimate since many move every six months or so within the area. Although they often winter in Florida and spend other months in the Midwest or California, most Boston Gypsies have claimed this area as their principal home city for as long as 30 years.

Dr. Thomas said that he once asked a Gypsy leader, "Why do you travel so much?" He was told, "Well, we're Gypsies. That's what we're supposed to do."

In the Gypsy language, a male of that race is a *rom;* a female, a *romani;* and a non-Gypsy, a *gajo* (a distinctly pejorative term). A *familia* is an extended family, often three or four generations (anywhere from 6 to 20 people) living in a single household. Sometimes, a group of familia will form a *kumpania,* or town. It can come and go as the Gypsies do.

Gypsies have little regard for schooling. "Fewer than half the Gypsies I knew were literate," Dr. Thomas said. "Frequently the parents used grade school as a sort of baby-sitting service. To this day, fewer than half of the Gypsy children are learning to read or write. Certainly by the seventh or eighth grade, they will drop out completely to take part in family affairs."

When a Gypsy girl reaches 14, her family begins to look for a husband for her. The prospective bridegroom's family will pay thousands of dollars for the arranged marriage. The wedding typically lasts three days. Often when it begins, the couple will have just met, although more often than not they are cousins.

How the Gypsies get by economically is uncertain. Generally, the women earn money telling fortunes, and the men claim to be roofers, auto repair workers, or driveway paving specialists.

By their own admission, the work of Gypsies is rather irregular. Dr. Thomas once asked a patient what he did for a living. "I'm a roofer," the patient said. "How many roofs do you do in a year?" "Some years a thousand or so, other years a little less." "How many have you done so far this year [It was already December]?" "Well, so far, none."

All of the Gypsies whom Dr. Thomas met received some form of public assistance, but that failed to explain how, during Gypsy feasts, the parking lot always happened to be filled with high-priced, late model automobiles and pickup trucks.

Although various conclusions have been reached about the life-style of Gypsies, they do maintain a very strict code of justice. A complex series of councils across the country handle Gypsy civil matters, and there is even provision for an appeal to a higher court called the *Kris Romani.*

Gypsy religion is an interesting amalgamation of beliefs. In addition to having certain deep-seated Gypsy spiritual convictions, the people often affiliate with a religion practiced where they happen to live. In the Middle East, Gypsies have turned to Orthodox Judaism or have become Orthodox Muslims. In Boston, the Gypsies are largely Greek Orthodox. In Virginia and other parts of the South, some Gypsies have begun to join the fundamentalist Pentecostal churches.

As to health, Dr. Thomas told his medical audience that among the Gypsies he has known, virtually all developed hypertension by age 40, diabetes affected 90 percent by age 50 (rivaled only by America's Pima Indians), and almost all had some evidence of atherosclerosis by age 60.

The Gypsies are very unconcerned about what causes various disorders. "Of the group I studied, 86 percent were cigarette smokers, many having started at about 3 years of age," the doctor said. "And 83 percent were at least 20 percent over ideal body weight. Their diet is extraordinarily heavy in salt, sugar, and fat. Traditionally, the leader in any Gypsy community is literally the biggest man there."

Dr. Thomas said he once suggested to a patient that he take up jogging or some similar kind of activity. But the patient said he could not because he would have to take time away from family matters and thus would seem to be thinking only of his own welfare.

When it comes to securing medical attention for one of their own, Gypsies insist on the most prominent hospitals and doctors. On arriving at the MGH, they already know the name of every Chief of Service.

Since Gypsies belong to a collective society and are always in the company of other Gypsies, isolation in a hospital

A New Treatment Slows a Patient's Racing Heartbeat

Lorraine King, who received a special electrical treatment to control a racing heartbeat, is examined by Dr. Jeremy Ruskin during a follow-up visit to the MGH.

When Lorraine King came to the MGH on the recommendation of a major Boston teaching hospital, her heart was racing at from 180 to 220 beats per minute.

"My body actually trembled," the 54-year-old Taunton resident said. "At home, when my twin sister sat next to me, she claimed she could hear my heart pounding.

"I never knew when my heart might start racing. I could be sitting down relaxing, watching television, and all of a sudden my heart would start going like sixty."

Doctors tried every drug that might regulate her heart, but none stopped the arrhythmia, a malfunction of the organ's electrical pacing system. Arrhythmias claim a half million lives annually in the United States.

Normally, Lorraine would have faced high-risk, open heart surgery, but instead she underwent an experimental procedure performed at only a few hospitals in the world. When she came out of the anesthesia, she felt like a new woman. Her heart was now so silent she had to be reassured that it was still beating.

Today, several months after the treatment, Lorraine no longer worries about her heart. She is vigorous once again, fully able to keep up with her healthy sister, Loretta, and anxiously looking forward to resuming a favorite sport of surf casting on Cape Cod this summer.

Years of heart problems reached a critical point for Lorraine six years ago when surgeons had to replace both her mitral and aortic valves because they had deteriorated. The mitral valve channels blood into the heart's left, lower chamber (ventricle). From there, the blood is pumped by the ventricle out through the aortic valve to recirculate in the body.

The surgery restored a normal blood flow, but Lorraine subsequently noticed that her heartbeat was alternately slowing excessively and racing.

"I was awfully tired all the time," she said. "Sometimes it took extreme effort to go in to work."

One day last September, while at her job as a cafeteria employee at the Paul A. Dever State School in Taunton, Lorraine collapsed.

"For the first time in my life, I passed out cold," she said.

Her heart had slowed so much that a cardiologist had to install a pacemaker to assure that the beat would not fall below a safe level. But that did not correct the periodic abnormally rapid pace of the heart, a type of arrhythmia called tachycardia.

The solution for this seemed to be a "transcatheter electrical ablation," a technique conducted during the past few years in the Cardiac Electrophysiology Laboratory of the MGH's Arrhythmia Service.

Dr. Jeremy N. Ruskin, Director of the Service, said a "mapping" of Lorraine's heart showed that the abnormally fast beat was being caused by a malfunction of electrical signals in the right, upper reservoir (atrium) of her heart.

By feeding a special catheter or tube through a blood vessel leading to the heart, Dr. Ruskin and his colleagues were able to position the tip at a point in an electrical pathway between the upper chambers (the atria) and the lower chambers (the ventricles). Through the heavily shielded catheter, a charge of electricity was directed at the tissue called the A-V (atrioventricular) junction, causing a condition known as heart block.

The single, low-energy shock cut off further signals to tissue in a wall between the ventricles which normally stimulate them to contract and force blood through the heart. Cardiologists refer to this specialized tissue as the "bundle of His."

Lorraine's arrhythmia ended, and an escape mechanism automatically took over. Dr. Ruskin explained that patients with heart block commonly have a rhythm of about 50 beats per minute generated from below the site of the block.

"The patients feel fine with this rhythm," he said. "It's extremely rare that the heart will simply stop beating. We always install a pacemaker, however, as a backup."

Although heart block is in itself an abnormal condition, the goal of Dr. Ruskin's team was to create a situation that prevented something worse.

No physical or dietary restrictions follow unless the patient had a preexisting, unrelated heart disease. Lorraine King, for instance, continues to take warfarin, an anticoagulant drug, to prevent possible clot formation on her substitute heart valves.

Dr. Ruskin told of a man who underwent the same type of catheter ablation in

(Concluded on Page 8)

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room or with a gajo, an unbeliever, can be frightening.

To cope with this, the hospital allows one relative to remain with a Gypsy patient and even sleep in a cot by the bedside. At the same time, other family members maintain an around-the-clock vigil in one of the hospital's lobbies. There is frequent telephone communication with the patient's room to check on his progress.

After a Gypsy dies, fellow Gypsies stuff the casket with large amounts of cash. They believe that after death a Gypsy must first walk the face of the earth and pay back any ill-gotten gains before ascending to heaven.

And even when he reaches the gates of heaven if he has left any body parts on earth, he must have enough money left over to buy them back. ■

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Probing Electrical Paths in a Faulty Heart

(Concluded from Page 7)

the Cardiac Electrophysiology Laboratory two years ago. He enjoyed an even more favorable outcome than did Lorraine.

"He was incapacitated by his tachycardia and tired of taking drugs," the MGH cardiologist said. "The drugs either didn't work or their side effects made him sick.

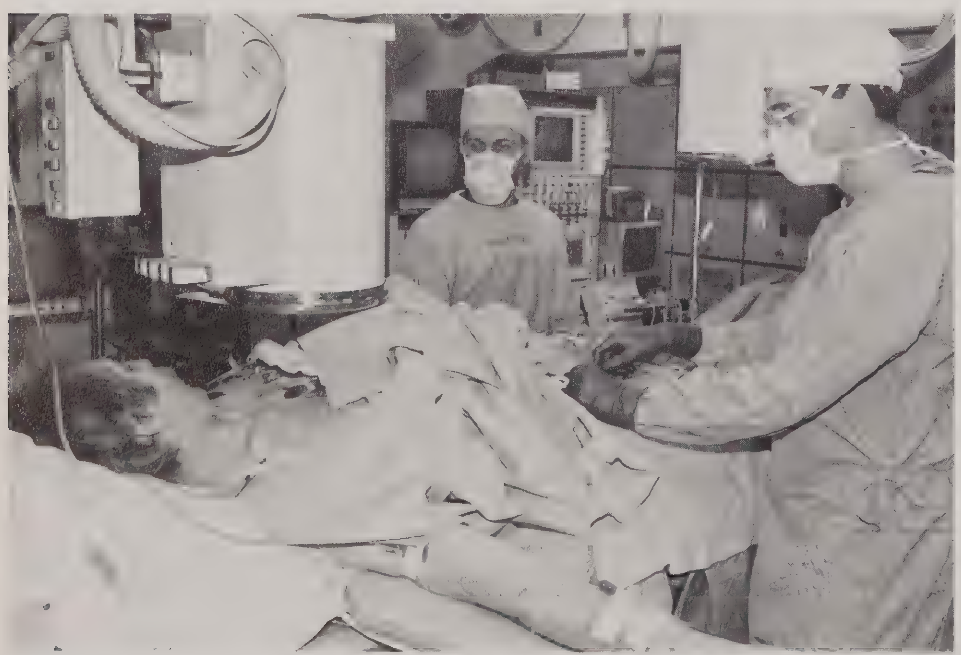
"He underwent the same low-energy shock treatment that had been administered to Miss King, but in his situation we were able to block just one portion of the A-V node, the portion causing the abnormally fast heartbeat. Normal impulses continued to go through to the bundle of His."

The patient has never had another episode of tachycardia and has never needed a pacemaker. He is considered cured of his illness.

Catheters are not only used to deliver shock treatments but also to help with the crucial mapping of the electrical pathways in the heart. With multiple catheters placed at strategic points in the organ, a method of programmed cardiac stimulation deliberately produces a repeat of the tachycardia that the individual had been experiencing, but this time the condition is closely controlled.

The catheters are then moved around the heart to monitor the path of the electrical activity and to try to pinpoint where the irregularity is originating.

The mapping and catheter ablation often are performed on the same day. But if the mapping proves to be difficult and time-consuming, the patient, who has been admitted to the hospital, will have to return another day for the actual destruction of the troublesome portion of the circuit.



Drs. Hasan Garan, left, and Dennis Kuchar install catheters in the heart of Robert Romanowski to map its electrical pathways and find the source of an arrhythmia.

The ablation leaves some scarring but since the area treated is a miniscule portion of the heart's overall muscle mass, the mechanical function of the organ is not compromised whatsoever.

The average patient spends a week to 10 days in the hospital. This includes time for installation of a pacemaker.

Worldwide, the success rate for the ablation involving the bundle of His is better than 80 percent. Transcatheter ablation has been used in far more patients with atrial tachycardias than in those with ventricular ones.

At the MGH, more than 95 percent of ablation attempts in atrial tachycardia patients have succeeded, but Dr. Ruskin's laboratory has worked on more patients with the much more difficult ventricular problem. He concedes there is much to learn about this kind of arrhythmia.

"We have amassed more experience with ventricular tachycardia than any other single arrhythmia service in the country," said the MGH physician, who is also Associate Professor of Medicine at Harvard Medical School, "but the ablation procedure has not worked in many of these patients because the mapping is so very complex."

The use of an external device to deliver electrical jolts to the heart (cardioversion) is a familiar and effective means of stopping an arrhythmia (*MGH News,* May 1985), but it does nothing to cure the condition.

Drugs are also of varying benefit, although Dr. Ruskin said that an increasingly wide variety of medications are becoming available to cope with the problem.

"I do think, however, that as the precision and effectiveness of transcatheter electrical ablation advances," he said, "it may become much more widely used as a potential cure, which is obviously far more desirable than a lifetime of drug treatments." ■

MGH
News

Massachusetts General Hospital, Boston, Massachusetts
Vol. 46 No. 6
September 1987

Hip Fractures Increase Among the Nation's Elderly

A frequent consequence of growing old – a loss of skeletal bone – is posing a mounting health threat to Americans.

In 1970, some 200,000 hip fractures were recorded in the United States, the largest percentage affecting the elderly, particularly women. By 1980, the yearly incidence had risen to 270,000. Researchers predict the number will surpass 500,000 annually by the year 2000.

Hip fracture patients already account for more than half of all days spent in hospitals for broken bones.

Conditions such as osteoporosis that are characterized by bone thinning make older people more susceptible to fracture from accidents. "The incidence of hip fractures doubles every five years after the age of 50," said Alan M. Jette, Ph.D., Director of the Graduate Program in Physical Therapy at the MGH Institute of Health Professions. He added, "Of every 20 women who reach age 65, one will later suffer at least one hip fracture."

Few studies have been conducted in the United States on the disability impact of a broken hip on an older person. With this in mind, Dr. Jette set out in 1983 to follow the status of 75 patients admitted to the MGH with hip fractures. He sought to learn how they fared during the 12 months following their accident.

Speaking at a day-long seminar on geriatric medicine sponsored by the Spaulding Rehabilitation Hospital, a major affiliate of the MGH, Dr. Jette reported some of the results of the study he conducted with Dr. Edward W. Campion, Chief of the MGH Geriatrics Unit; Dr. Paul D. Cleary of the Division of Aging, Harvard Medical School, and Bette Ann Harris of the MGH Institute of Health Professions.

The average age of the patients was just under 80 years, and 67 percent were

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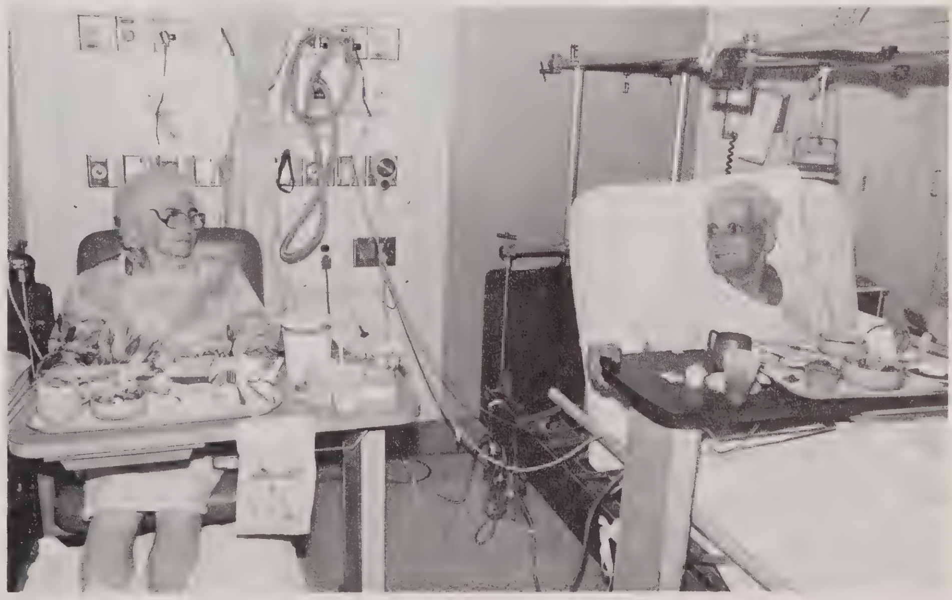

Mr. and Mrs. Carl Cirignano, both 87, were hospitalized with hip fractures after simultaneous falls in their home in Boston's North End.

New Tactics Bring Gains in the Fight Against Leukemia

A new strategy for overcoming one of the most lethal forms of cancer is producing impressive results.

Researchers are making new inroads against a cancer of blood-forming tissues – acute myelogenous leukemia (AML) – which principally affects adults and is the most common form of adult leukemia. Left untreated, AML is fatal within a few weeks of diagnosis.

In the last half dozen years, approximately 70 percent of adult patients with AML achieved a complete remission with initial drug treatment. With follow-up maintenance therapy, 5 to 20 percent of those in remission achieved cures (no relapses for over five years).

Despite all of their efforts, researchers have not been able to improve on the 70 percent remission rate. They have, however, been able to improve on ways to prevent remission relapses.

The investigators devised an intensive consolidation therapy to replace the maintenance care that customarily followed initial treatments. Since inception of the new strategy, some centers have even reported curing as many as half the adult patients they treated.

"Studies show that maintenance programs of up to a year help such patients compared to no treatment after achieving complete remission," said Dr. Philip C. Amrein, an MGH cancer specialist. "However, beyond that length of time maintenance therapy, given on an outpatient basis, probably has little value."

At first, in an effort to avert a possible

(Continued on Page 4)

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EDITORIAL:

The Dawning of Nuclear Medicine

Today we accept nuclear medicine along with lasers and a number of other "miracles" of diagnosis and treatment.

A Page 5 article recalls an era a half century ago when the science was in its infancy. Out of a study begun 50 years ago this month came the first method of treating humans successfully with man-made radioactive materials.

It is of interest that this pioneering research arose from a marriage of the engineering skills of MIT and the medical expertise of the MGH. Through the years a number of studies have brought those two institutions together. Among the more recent were the creation of artificial skin and the development and use of a device to measure pressures within the hip of a patient. Having those two neighbors straddling opposite shores of the Charles River has facilitated collaboration. The entire world has been the beneficiary.

Hip Fractures Become Increasing Threat

Our graying population is having increased attention devoted to it as more Americans are reaching old age. On the whole they are not only living longer but also becoming healthier than previous generations which in lesser numbers reached comparable ages. Hip fractures, however, have always been a special problem for the elderly. Among other reasons, the physical restrictions on movement which those fractures impose increase the risk of blood clots with all their attendant dangers.

There is no surprise therefore that the MGH Institute of Health Professions is studying the effects of hip fractures among the senior population. As such studies are undertaken, there is hope that improved ways of treating hip fractures will emerge. The effect of better treatment cannot be minimized. The promise is for still longer and improved quality of life.

Making Progress Against Leukemia

The very word "leukemia" sounds like a death sentence. Not many years ago it was. Then researchers began making progress against acute lymphocytic leukemia, the most common kind in childhood. Drug treatment using several medications simultaneously began producing longer and longer remissions, periods of freedom from any observable signs of the disease. Next came outright cures in some children. Now 80 percent of young children with the disease are cured.

Specialists treating the most common adult leukemia, acute myelogenous, seem to be headed down the same road as their pediatric colleagues. People with this quickly fatal form are living disease-free for longer periods. Some are already being cured. Continued research may wipe out both "common" forms of leukemia as life-threatening for those who seek treatment early enough.

Hip Fractures

(Continued from Page 1)

women. The mean length of stay in the hospital was 21.7 days.

Dr. Jette said that five percent of the patients died while in the hospital. Of the survivors, 32 percent were discharged directly to their homes. Forty percent went directly to a rehabilitation hospital. All 11 patients admitted to the hospital from nursing homes returned to them. Also sent there were 12 percent of the patients originally admitted to the hospital from their own homes.

By the end of the 12-month postfracture period, 74.1 percent of the survivors were living at home, but the overall mortality toll had risen to 29 percent.

Dr. Campion described hip fracture patients in advanced years as particularly fragile. "They have slim margins of reserve, often both physically and mentally," he said. "As they grow older, their risk increases, in part because of a higher prevalence of chronic conditions."

Among patients in the MGH study who survived, efforts to restore prefracture function were disappointing despite intensive as well as standard approaches to rehabilitation.

Thirty-three percent regained basic prefracture status (transferring from bed to chair, dressing, walking around indoors).

Twenty-one percent regained more complicated prefracture ability (climbing stairs, preparing meals, doing dishes and light housework, walking outdoors).

And 26 percent regained former social functioning (taking care of or visiting other people, using public transportation, food shopping).

Many of the 75 patients in the study not only had a broken hip but one or more other afflictions as well. More than 50 percent had osteoarthritis, and a sizable number heart problems. Hypertension and urinary tract infections affected a third. Nineteen percent had pneumonia. Half of the population was confused.

"There has to be a more sophisticated and widespread geriatric rehabilitation program for the fragile elderly patient," Dr. Campion said. "It's not just caring for the hip. It's caring for the whole individual."

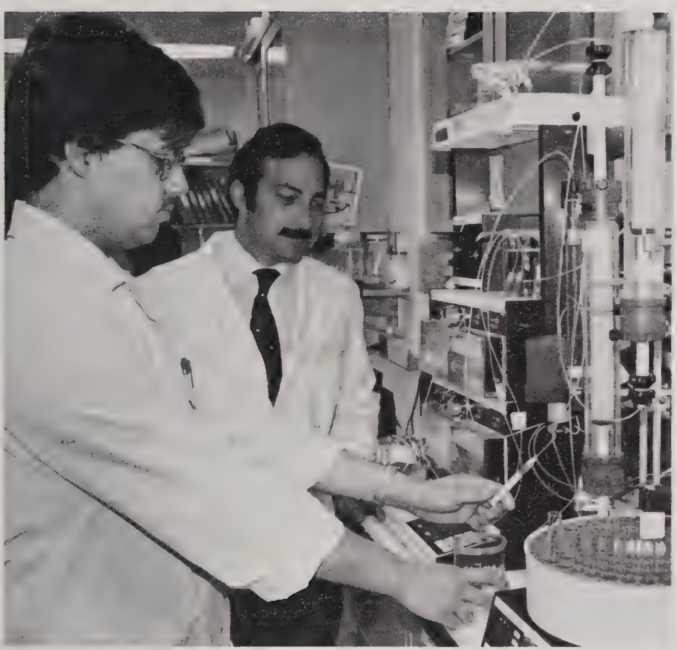
In a formal report prepared for publica-

Photographs: Page 1, Scott Davis; pp. 3, 4, Myron Daniels; pp. 5, 6, MGH Archives

Drawings: Pages 7, 8, courtesy of American Society for Surgery of the Hand

tion in the *Archives of Physical Medicine and Rehabilitation,* Dr. Jette wrote that the demand for rehabilitation services following a hip fracture will most likely continue to increase.

"Better natural history studies with larger, more representative samples both in the U.S. and abroad are needed," he wrote, "to define more precisely the key factors related to functional recovery after a hip fracture. Only then will we have the basis to design more effective intervention programs that address the needs of those patients."■



As Dr. Samuel Doppelt looks on, Research Associate Andrew Augustine uses liquid chromatography to separate certain proteins from serum. In high quantity the proteins could denote a thinning of bone.

Bones Thin? Don't Assume Osteoporosis

A middle-aged man came to the MGH one day and complained that he had been experiencing severe bone pain for more than two years.

On the basis of an X-ray examination, physicians elsewhere had determined that he was suffering from osteoporosis, a bone-thinning disorder common among people past 40 (*MGH News,* November 1986).

When the patient's pain persisted, the doctors again performed the radiological test, but the diagnosis remained unchanged.

At the MGH, the 55-year-old patient sought help from Dr. Samuel H. Doppelt, an orthopedic surgeon and endocrinologist. On learning that the diagnosis had followed only the reading of an X ray, Dr. Doppelt ordered a simple blood test.

It changed the entire picture. The test uncovered an abnormality which indicated that the patient had multiple myeloma, a malady more serious than osteoporosis. Treatment for the newly diagnosed condition—a tumor in cells of the bone marrow—is totally different from that for osteoporosis, a condition which does not signify abnormal bone but simply too little bone.

Given drugs highly effective against his disorder, the patient reported that his pain soon stopped, and so did the progression of his illness.

Dr. Doppelt recounted this incident at a recent seminar on geriatric medicine sponsored by the Spaulding Rehabilitation Hospital. He said the man's problem had been missed because "no one bothered to look for it."

Many maladies, such as multiple myeloma, are characterized, he said, by a thinning of bone (osteopenia), which makes the bone more susceptible to fracture. Statistically the most common bone loss disorder is osteoporosis. On X ray, it can appear identical to other afflictions that affect bone.

"When people scan X rays or think of someone having less bone than appropriate for a given age," Dr. Doppelt said, "they are quick to think of osteoporosis and tend to overlook a differential diagnosis; that is, reaching a finding through exclusion of other possibilities."

Although bone loss can result from nutritional, endocrinologic, genetic, metabolic, or drug induced causes, Dr. Doppelt urged a check for four specific conditions following any X ray disclosure of thin bones. If the findings prove negative for all four, he said, then chances are better than 99 percent that the patient does have osteoporosis.

The conditions recommended for checking are osteomalacia (also known as adult rickets), multiple myeloma, thyrotoxicosis (severe hyperthyroid activity), and hyperparathyroidism.

Osteomalacia is a softening of bone due to a deficiency of vitamin D. Although fortifying milk with vitamin D has long been practiced in this country, older citizens not infrequently lack the vitamin. They just do not drink much milk.

The administrator of a nursing home once assured Dr. Doppelt that residents at the home are served lots of milk. "I'm sure that is so," the doctor responded, but he asked, "How much of its comes back to the kitchen?"

Exposure to the sun also enables the body to make vitamin D, but the MGH physician said that, in addition to avoiding milk, senior citizens do not sunbathe very much.

Disease-related fractures and holes in bone are characteristic but not consistent findings in multiple myeloma. Dr. Doppelt said that as many as 40 percent of such patients turn out to have X rays identical to those of osteoporosis patients.

In thyrotoxicosis, also called Graves' disease (*MGH News,* June–August 1987), an excessive secretion of thyroid hormone leads to a high consumption of oxygen, a high metabolic rate, and generalized bone loss. Medication to suppress thyroid activity is readily available.

Hyperparathyroidism is an excessive hormonal production by the parathyroid glands (*MGH News,* September and October 1980). The hormone controls the release into blood of calcium from its storehouse in bones. A release of too much calcium can lead to bone thinning, kidney stones, and stomach ulcers. The remedy for hyperparathyroidism is surgical removal of the glands.

Dr. Doppelt told of treating a woman who was informed elsewhere on the basis of an X ray that she had terminal cancer. Holes and fractures in her bones were interpreted as signs that cancer had spread from another part of her body.

"Tests showed instead that the patient had hypercalcemia [an elevated blood calcium] and a parathyroid hormone value that had gone through the ceiling," Dr. Doppelt said. "Following removal of the glands, the patient's fractures healed within three weeks. Healthwise, she became a new person."

(Continued on Page 4)

Dr. Philip Amrein examines Lorraine Rodrigues, a leukemia patient.

Leukemia Yields to New Method of Care

(Continued from Page 1)

relapse, physicians scheduled maintenance treatments of a mild to moderate nature. Patients would return to the clinic every month or two to receive intravenous injections or oral medications.

Several studies were conducted to determine whether it would be wiser to administer much more intensive treatment during remission.

Instead of a maintenance therapy, the plan called for a patient to be rehospitalized for four to five weeks of additional drug therapy. After a few weeks at home to rest and rebuild strength, the individual would undergo still another series of inpatient treatments, generally termed consolidation cycles.

An association of major medical centers called the Cancer and Leukemia Group B (CALGB), which includes the MGH, conducts a program which presently provides for four consolidation therapy cycles.

"We don't know how many actually are needed to achieve a cure," Dr. Amrein said. "Perhaps only one or two will suffice. Only time and very good control studies will tell."

The new treatment strategy can be difficult for the patient, he agreed, but he said that little is gained by quitting early before the entire job is done.

"The patient who is in complete remission feels and looks well," he said. "It is difficult for that person to realize that a lot more work lies ahead before he is cured of the leukemia."

When remission is complete, more than 99 percent of a patient's leukemia cells may have been eliminated. If a physician examined such a patient without knowing the person had leukemia, the doctor might not realize that any illness was present. Yet, any small fraction of diseased cells remaining after initial treatment would likely grow back, resulting in relapse and death within three years.

Sixty to seventy percent of adults with leukemia have either the acute or chronic myelogenous form. The disease is an abnormal proliferation of precursors of certain white blood cells (polymorphonuclear neutrophils) which normally protect against bacterial infections.

The remainder of adult patients have acute or chronic lymphocytic leukemia. This affliction strikes at other white cells (lymphocytes) which normally guard against conditions such as viral and fungal infections.

In childhood leukemia, where great strides have been made in treatment, lymphocytic leukemia predominates.

Dr. Amrein said that high doses of a drug long used for leukemia are probably responsible to a large degree for the surprisingly good results of late in treating AML among adults.

"We think that cytosine arabinoside is the most important drug for the treatment of this adult leukemia," he said. "Investigators have experimented with the medication in many different ways."

He said that two drugs used together seem to work best against the disease; when a third is added, it just creates toxicity.

To achieve remission, the CALGB, headquartered at the Dana-Farber Cancer Institute in Boston, uses a long-standing regimen consisting of cytosine arabinoside, given for seven days in low dose, continuous infusions, and daunarubicin, an anitbiotic cytostatic drug, given over a three-day period.

In the consolidation therapies that follow, high doses of cytosine arabinoside are given to eradicate any leftover resistant or hidden cells.

Dr. Amrein is principal investigator of a nationwide, federally funded study of two new drugs, mitoxantrone and diaziquone, in the treatment of relapsed AML. If the combination proves highly effective, it could be moved up to be the initial treatment regimen or one of the consolidation cycles.

Under a grant from Adria Laboratories, Dr. Amrein also directs an MGH study of a drug called idarubicin to see how well it works with cytosine arabinoside. Idarubicin is closely related to daunarubicin but may offer additional advantages.

During treatment, if a patient suffers

Thin Bones

(Concluded from Page 3)

Until recently, the full extent of a bone mass decline could only be estimated since the decrease is not necessarily uniform throughout the body. X ray does not begin to detect bone thinning until a 30 percent loss has already taken place.

The problem was solved with development of a device capable of measuring total bone in a patient (*MGH News*, November 1986). The new instrument has been installed at the MGH and a few other medical centers in this country.

"I think that in the future we will see a much greater emphasis on early detection of calcium deficiencies," said Dr. Doppelt, who is a member of the MGH Mineral Metabolism Unit as well as Assistant Professor of Orthopaedic Surgery and Medicine at Harvard Medical School.

"Like hypertension, conditions such as osteoporosis start off as basically silent disorders. By learning of a calcium deficiency at the age of 35 or 40 and taking an appropriate supplement, bone loss and the problems associated with it in later life might be avoided."■

Remembering the Early Days of Nuclear Medicine

Long before the United States unleashed the awesome power of the atomic bomb to end World War II, scientists at the MGH and MIT pooled their talents and harnessed nuclear energy for another purpose – to battle disease.

This month marks the 50th anniversary of work that led to the first successful treatment of humans with an artificially radioactive material; specifically, radioactive iodine to treat an overactive thyroid gland (hyperthyroidism).

The collaboration between the MGH Thyroid Unit and the Radioactivity Center at the Massachusetts Institute of Technology helped to usher in the era of nuclear medicine.

Radioactive iodine and the technique by which it was first administered to MGH patients still hold an important place in the treatment of thyroid illnesses.

Knowledge of the relationship between iodine and the thyroid gland which regulates chemical changes in the body (metabolism) can be traced to ancient days. Enlarged thyroid glands (goiters) were treated then with seaweed and burnt sponge, both of which contain iodine.

Scientific studies during the 1800s and early 1900s established that iodine is an essential ingredient of thyroid hormone and that in order to obtain iodine to produce the hormone the thyroid gland has developed a special avidity for the element.

It came as no surprise, therefore, in November of 1936 that Dr. Saul Hertz, Chief of the MGH Thyroid Unit, posed a question to MIT President Karl T. Compton at Harvard Medical School when Dr. Compton delivered a talk on "What Physics Can Do for Biology and Medicine." Dr. Hertz asked whether it was possible to produce a radioactive iodine.

Dr. Compton did not know the answer immediately but promised to look into it. The following month he wrote Dr. Hertz to say that indeed iodine can be made artificially radioactive. This set in motion joint studies to learn if such iodine could serve as a tool in the study of thyroid physiology and possibly as an agent in the diagnosis and treatment of thyroid disease.

Prof. Robley D. Evans of MIT assumed charge of the physics phase of the program and retained the services of a young physicist, Arthur Roberts, Ph.D., for the project. Working under the general direction of Dr. James Howard Means, MGH Chief of Medical Services, Dr. Hertz collaborated with Dr. Roberts on the medical aspects. Dr. Means described the arrangement as a sound partnership of physicists and physicians.

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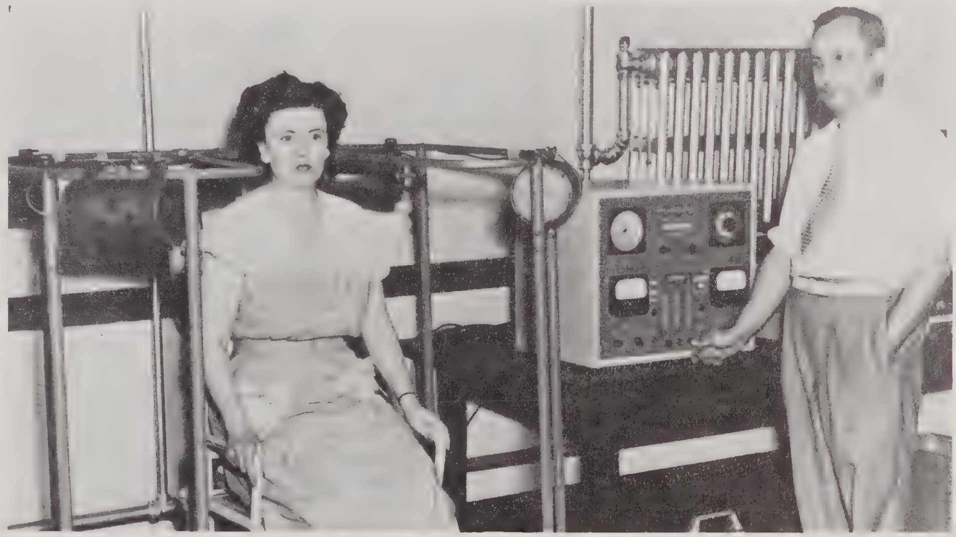

In this photo taken in the early 1940s, Dr. Saul Hertz uses a multicounter to study the distribution of radioactive iodine in a patient.

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episodes of bleeding, the physician can usually control the condition with blood-clotting platelets and with plasma. And a great variety of antibiotics is at the doctor's disposal to fight infections. "Excellent supportive care is the key to getting patients through the dangerous periods when the normal white cells and platelets are very low," the MGH specialist said.

A number of centers are investigating bone marrow transplantation as a way to beat leukemia. The centers tend not to do such transplants, however, until the patient's leukemia has been in remission for several months. And a patient over 40 is usually not accepted for the procedure. Hence, less than 25 percent of adults with AML are ever even considered for bone marrow transplantation.

Dr. Amrein, who is also Assistant Professor of Medicine at Harvard Medical School, said that 30 percent of patients given someone else's bone marrow subsequently die from graft-versus-host disease. Another 10 to 20 percent die from infectious complications.

"Since the cure rate is rising so much in the consolidation therapy programs," he said, "many physicians are recommending these treatments during the first remission and that a bone marrow transplant be held off until a second remission."

Once a patient relapses, the chances of a second remission depend upon several factors. A person in remission for a year or longer has a better outlook after a relapse than someone whose relapse follows a remission of only a few months. Also, age is important; the older the patient, the less able he is to survive the treatment.

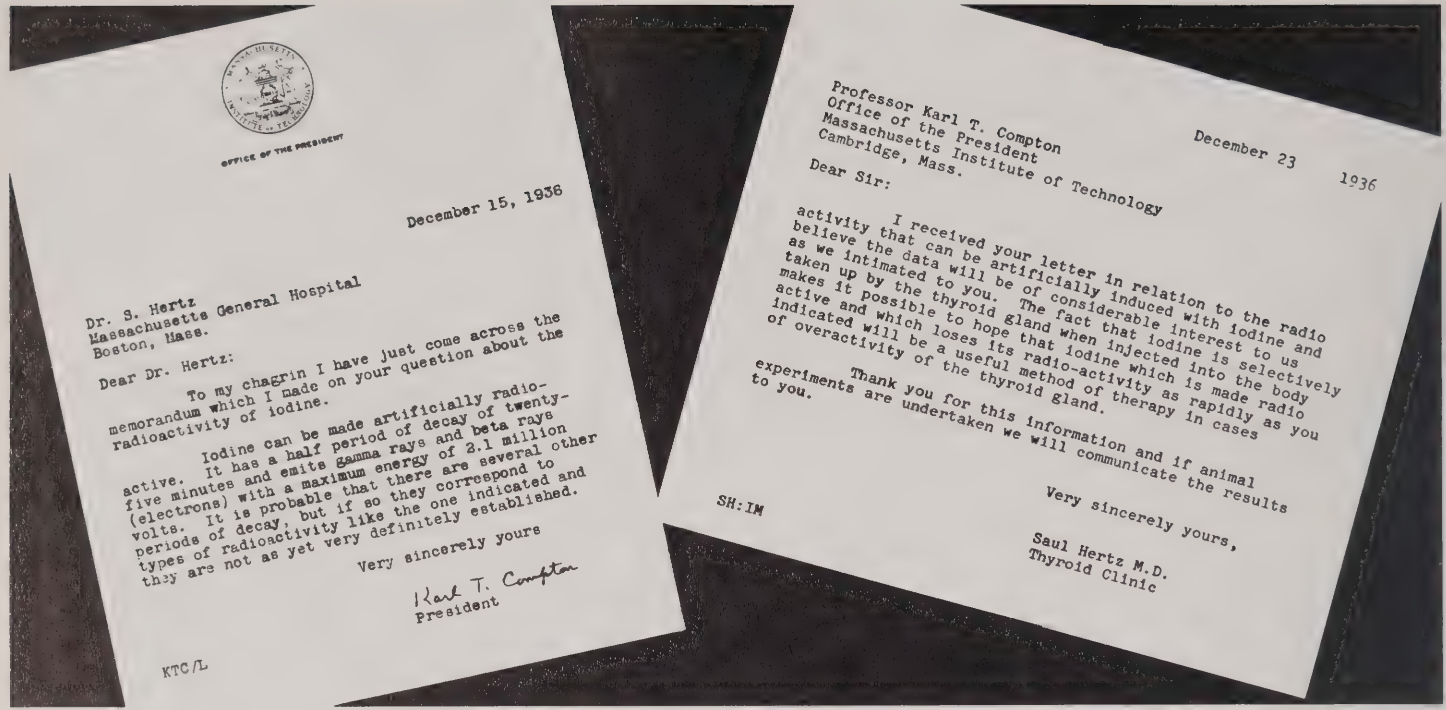
In childhood leukemia, Dr. John T. Truman, MGH Chief of Pediatric Hematology–Oncology, said that it is far better for a patient to be a 5-year-old instead of a 15-year-old.

Among teenage leukemia patients with high white cell counts, Dr. Truman estimates the recovery rate at about 50 percent. At the other extreme, in children between 2 and 6 years of age who do not have a high white cell count, recovery from leukemia is about 80 percent.

"We're using the same drugs that we did six or seven years ago but more of them," he said.

The American Cancer Society estimates that 24,600 adults and 2,000 children will be diagnosed during 1987 as having leukemia. In the same year, the society expects to learn of 17,800 deaths from all forms of the disease.

In a sense, specialists who treat adults for this devastating blood disorder are taking a lesson from their pediatric colleagues. The route to successful treatments in children involved aggressive medical action, with accompanying risks. Applied subsequently to adult patients, the same course of care initially failed, but when the therapy was further intensified, and the risk-taking increased, the strategy began to work.■



OFFICE OF THE PRESIDENT

December 15, 1936

Dr. S. Hertz
Massachusetts General Hospital
Boston, Mass.

Dear Dr. Hertz:

To my chagrin I have just come across the memorandum which I made on your question about the radioactivity of iodine.

Iodine can be made artificially radioactive. It has a half period of decay of twenty-five minutes and emits gamma rays and beta rays (electrons) with a maximum energy of 2.1 million volts. It is probable that there are several other periods of decay, but if so they correspond to types of radioactivity like the one indicated and they are not as yet very definitely established.

Very sincerely yours

Karl T. Compton
President

KTC/L

Professor Karl T. Compton
Office of the President
Massachusetts Institute of Technology
Cambridge, Mass.

December 23 1936

Dear Sir:

I received your letter in relation to the radio activity that can be artificially induced with iodine and believe the data will be of considerable interest to us as we intimated to you. The fact that iodine is selectively taken up by the thyroid gland when injected into the body makes it possible to hope that iodine which is made radio active and which loses its radio-activity as rapidly as you indicated will be a useful method of therapy in cases of overactivity of the thyroid gland.

Thank you for this information and if animal experiments are undertaken we will communicate the results to you.

Very sincerely yours,

Saul Hertz M.D.
Thyroid Clinic

SH:IM

Role for Radioactive Iodine Quickly Found

(Continued from Page 5)

The work was supported initially by the Milton Fund of Harvard University and later by help from the John and Mary R. Markle Fund.

The first task was to make radioactive iodine. Since there was as yet no cyclotron in Cambridge, a neutron source was prepared under Professor Evans' direction by mixing radium and beryllium. Dr. Roberts was then able to produce a form of radioactive iodine called I-128. It had only a 25-minute half-life (the time in which half of its atoms lose their radioactivity through disintegration).

This meant that after the I-128 was made Drs. Hertz and Roberts had only an hour or an hour and a half to anesthetize a test rabbit, inject the animal, remove its thyroid gland, and, using a Geiger counter, determine the amount of iodine taken up by the gland by measuring the radioactivity present.

"Actually, our very first experiments were aimed at finding out whether the iodine would be collected at all," said Dr. Roberts from his home in Illinois. "The total amount of iodine in a rabbit's thyroid is only about a milligram or so. Our work started in September of 1937 and by December we had already detected the iodine in the gland. It was a nice Christmas that year."

After lengthy studies with normal rabbits, the researchers began experimenting with rabbits which had stimulated thyroid glands (hyperplasia). A rabbit that was pregnant or put on a cabbage diet would develop hyperplasia. The condition could also be created through the administration of certain hormones.

"It turned out that these animals took up more iodine than the normal ones," Dr. Roberts said. "The tests showed that the physiology of the stimulated thyroid is such that it is literally hungry for iodine. That had not been realized in the past."

The promise shown by the early work with I-128 helped make it possible for MIT to obtain funds with which to build a cyclotron. When it went into operation in 1940 it supplied the thyroid investigators with a new isotope (I-130) with a half-life of 12.5 hours. This permitted a start of diagnostic experiments with humans.

By using tracer doses (small amounts for diagnostic purposes) of I-130 the researchers determined how much iodine the human thyroid took up. Soon after, one could calculate how much radioactive material was required for treatment.

The idea behind radioactive iodine as a therapy was that the abnormal thyroid's appetite for iodine would draw the radiation directly into the gland's abnormal cells. Beta rays created by the radioactivity would then destroy these cells. The short-distance nature of the beta activity assured protection for nearby healthy cells.

This therapeutic approach was clearly superior to the use of X ray since in order to reach the treatment site X ray would have to traverse many tissues which one does not want to irradiate.

When treatments began and the role of the physicist in the program became somewhat routine, Dr. Roberts left the project and joined the MIT Radiation Laboratory.

Dr. Hertz stayed on until 1943 when he joined the U.S. Navy. Upon entering the service, he invited Dr. Earle M. Chapman of the MGH Thyroid Unit to follow the hyperthyroid patients whom Dr. Hertz had treated.

In May of 1946, Drs. Hertz and Roberts reported in the *Journal of the American Medical Association* a three-to-five-year follow-up on 29 patients. The authors listed 20 as cured.

In a news interview Dr. Hertz was asked why there had been nine failures. He replied that in the early days of treatment the precise dose that a patient should receive was not always known. He said he felt sure that with this knowledge "we would have come up with 29 successes."

Dr. Hertz's pioneering work with radioactive isotopes ended in 1950 when the MGH endocrinologist and graduate of Harvard Medical School died suddenly at the age of 44.

But at the MGH and other major centers, in a silent tribute to scientists like Saul Hertz, radioactive iodine continues to serve as a useful tool in the diagnosis and treatment of thyroid disease.

Even Dr. Hertz's early practice of administering a dose of normal iodine after a radioactive one is still followed occasionally. The normal iodine produces a temporary but immediate desired drop in the patient's metabolic rate, thus relieving disease symptoms. This allows time for the radioactive iodine to impose a permanent therapeutic effect.

Dr. Gilbert Daniels of the MGH Thyroid Unit said that in coping with hyperthyroidism today an eight-day isotope called I-131 has proved to be "a simple, safe, and effective therapy."

"If the patient's entire gland is involved," he said, "the treatment in all likelihood will lead to hypothyroidism [an underactive thyroid], but this can be easily treated with pills.

"If the overactivity comes from only part of the gland – a lump, for instance – then only the abnormal portion will take up the iodine, and the gland will usually wind up functioning normally."

Well-differentiated thyroid cancer does not normally take up iodine but can be stimulated to do so. Suppose a patient had a thyroid cancer that had spread to the lungs. Making the patient hypothyroid would generate a release of more thyroid stimulating hormone (TSH) by the pituitary gland, which regulates thyroid activity much like a thermostat.

"The TSH would drive the tumor to take up the iodine in two thirds of such patients," Dr. Daniels said. "In this way, one could actually destroy metastatic thyroid cancer, particularly in young patients."■

Treating a Disorder That Strips Hands Of Their Power

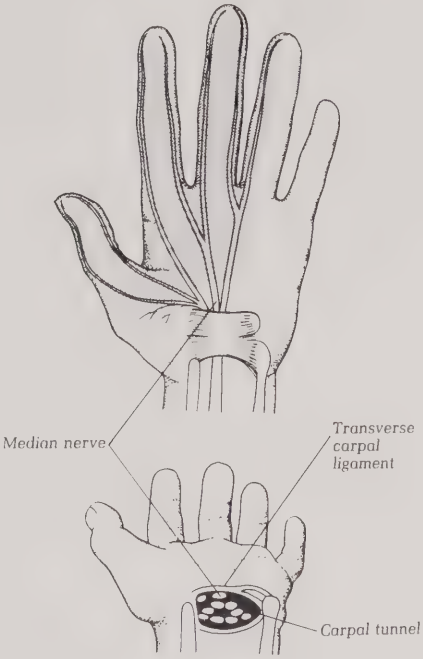
To many physicians, the patient's complaint sounds so familiar.

"Doctor, I'm frequently awakened during the night by a sudden sharp tingling in my hand. The sensation radiates right down to my fingertips. Sometimes, the hand then goes numb and weak."

The patient, typically a woman in her mid fifties, usually finds that a vigorous shaking or massaging of the hand will bring relief. Occasionally, however, the discomfort may last for hours and recur several times a night.

Physicians long ago traced the condition to a nerve entrapment in the wrist (carpus) and labeled the disorder as "the carpal tunnel syndrome" (CTS). A number of medical conditions such as an underactive thyroid (hypothyroidism), diabetes, rheumatoid arthritis, and gout can give rise to CTS, and it has also been suggested that CTS can result from repetitive occupational activities employing the wrist.

"The vast majority of patients with carpal tunnel syndrome have no idea how they developed the problem," said Dr. Richard H. Gelberman, new Chief of Hand Surgery in the MGH Orthopaedic Surgery Service. "Often, that issue is never resolved."



The structures involved in carpal tunnel syndrome and in the surgical relief from it

The syndrome refers to a compression of the median nerve which extends through the wrist and into the thumb, index finger, long finger, and part of the ring finger to supply sensation to those digits (*see diagram*).

The entrapment takes place in a roughly one inch by one half inch wrist opening. The median nerve in each hand shares this carpal tunnel space with nine flexor tendons. Eight go to the fingers and one to the thumb, enabling them to bend.

Dr. Gelberman said that CTS can result from swelling (edema) in the carpal tunnel as a result of the medical illnesses or from an inflammation (synovitis) in the lining of the tendons due to exertion upon the wrist by various activities. Being the softest structure present in the tunnel, the median nerve can become easily compressed.

The doctor explained the nighttime symptoms so typical of the disease by pointing out that people customarily sleep with their wrists bent, or limp. Studies he has conducted on pressures within the carpal canal showed that they reach their highest levels when the wrist is in flexion. That increases symptoms by reducing the blood supply.

Patients sometimes complain of referred pain in a forearm and even as far up as the shoulder. The symptoms may arise while the patient is at the wheel of a car or engaged in some similar sustained activity.

A person who suspects presence of the syndrome can perform a simple test. Tap on the palm side of the carpal tunnel with a finger. If the median nerve is compressed, a shooting, tingling pain extending down into the fingers will be felt.

Another test calls for resting an elbow on a table and allowing the wrist to bend completely for one minute. If the patient has CTS, this position may produce abnormal sensations in the hand.

How CTS should be treated depends on the extent of involvement. "If a patient has mild findings on examination and in nerve conduction tests and had symptoms less than a year, then it probably would be worthwhile to attempt conservative treatment," Dr. Gelberman declared.

He said this would involve injection of an anti-inflammatory agent into the carpal canal and splinting the wrist for three weeks to keep it in a neutral position. If symptoms recur, the patient would then be considered a candidate for surgery.

If initial examination of a patient shows an advanced condition and symptoms had persisted for longer than a year, the individual would be considered for surgery from the outset.

The surgery, usually a 30-minute procedure conducted under local anesthesia on an outpatient basis, involves dividing a stout, inch-long ligament on the palm side of the wrist.

"The transverse carpal ligament completes the arch of the wrist, which is basically formed by eight bones," said Dr. Gelberman, who is also Professor of Orthopaedic Surgery at Harvard Medical School. "Dividing the ligament decompresses the carpal tunnel and gives the median nerve breathing room. Surgery on the ligament does not cause any known functional loss."

Dr. Gelberman said that if left untreated pressures in the carpal tunnel as well as irritations in the linings of the tendons would increase, causing greater loss of the blood supply and a swelling of the median nerve itself. The nerve's fibers could then suffer irreversible damage.

"Such damage can lead to a significant degree of disability," Dr. Gelberman said. "The patient would be weak in

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Study Urged on Causes of Hand Affliction

(Concluded from Page 7)

manipulating the thumb because the median nerve controls the thumb muscles and would also lose feeling in the thumb, index, long, and half of the ring fingers."

With regard to the causes of CTS, opinions vary on the role that repetitive hand movements in a job may play. Drs. Gelberman and Glenn B. Pfeffer discuss this in a chapter on CTS written for a newly published book, *"Clinical Concepts in Regional Musculoskeletal Illness."*

They wrote that an appellate court in Delaware refused to reverse denial of a compensation claim for CTS in both hands brought by a worker who used a vibrating air gun in his job. The court felt that the employee must have had a peculiar susceptibility to the syndrome because others performing the same task were not affected.

In another case, the doctors wrote, an appellate court in Missouri allowed a woman's claim that CTS resulted from a job she had involving work on luggage. The court attributed the syndrome to "repetitive flexion under pressure" and said this was an exposure greater or different than affects the public in general.

The authors commented on a study of CTS patients in an English rheumatology clinic. Seventy-nine percent had jobs requiring light, highly repetitive movements of the wrist and fingers. Of unemployed housewives in the CTS group, 51 percent knitted.

"The suggestion from this study," the doctors wrote, "is that if CTS is an occupational disease, it is so only to the extent that certain wrist and hand motions are exaggerated in the workplace. That CTS involves discomfort with usage may simply reflect the fact that usage exacerbates the underlying disease."

Well-designed studies are needed, they said, to define the roles of both one's physical health and hand usage patterns in the development of the disorder.

An MGH specialist in occupational health, Dr. Elisha Atkins, said many plants have established health and safety programs to prevent disabilities such as carpal tunnel syndrome.

An internist at the hospital's Chelsea Memorial Health Center, Dr. Atkins holds a master's degree in occupational health from the Harvard School of Public Health. He frequently visits plants at their invitation for on-site inspections.

"Averting carpal tunnel syndrome may often be just a matter of taking simple measures to redesign a tool or a job," Dr. Atkins said.

"It's been found, for instance, that a tool with a handle one can grip by making a fist causes much less tension upon a wrist than a tool one must hold with the fingertips."

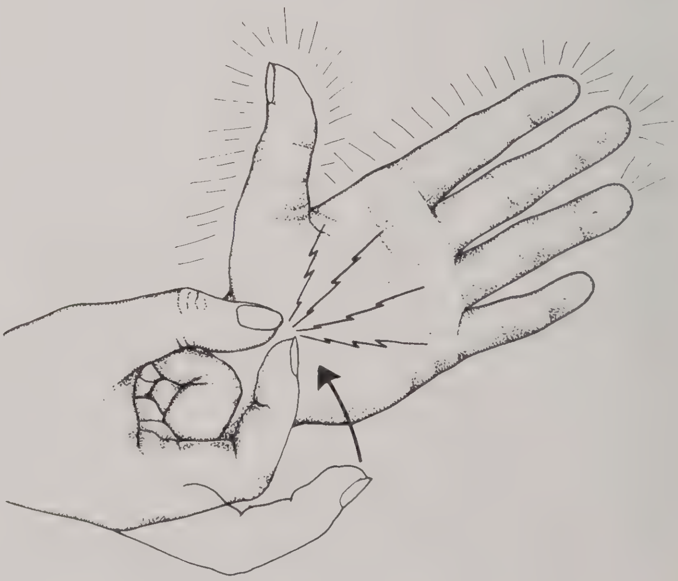
If a job calls for making an angulated cut, the tool, such as a pair of scissors, could be designed with a curved construction. The cut could then be made without need to bend the wrist.

Constant flexing of the wrist might also be avoided by altering the height of a work table or by simply furnishing a stool to enable a worker to handle a product more comfortably.

Rotating job responsibilities has also been proposed to avoid CTS. Dr. Atkins told of visiting a plant which made rubber bands. Workers would grab handfuls of rubber bands and stuff them into boxes. Since the employees were compensated on a piece rate, they had to act fast in repetitive fashion to maximize their pay checks. CTS never became a problem, however, because the workers were never assigned to the same task for very long.

In most instances, a prompt stopping of the offending action, whatever it may be, will lead to recovery. But even if the patient winds up requiring surgery, there is one consolation: Few operations are as successful and rewarding as the operation for carpal tunnel syndrome.■

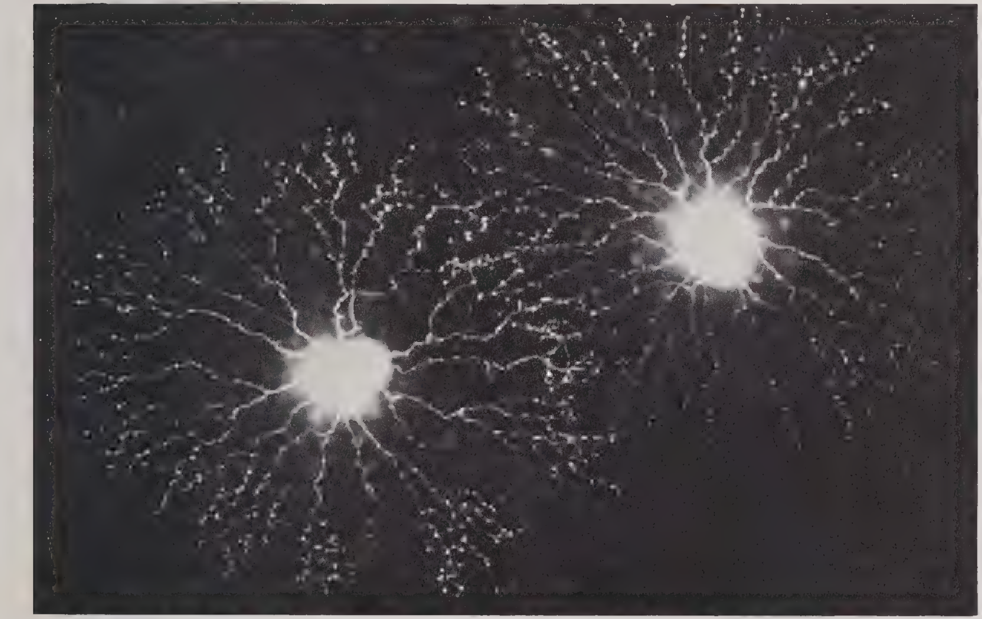
Pain from tapping on the palm side of the carpal tunnel can indicate the presence of the syndrome.



MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 46 No. 7 October 1987

Watching as a Portion of the Brain Does Its Work



This seeming display of fireworks actually is a microscopic view of nerve cells from the retina at the back of the eye. When alive, the cells communicate by means of their twig-like branches, or dendrites.

An MGH scientist is peering through a keyhole at the brain to try to unlock secrets of how the mind functions.

Most medical professionals who study the eye are primarily concerned with sight. In the MGH Neurosurgical Service, Richard H. Masland, Ph.D., studies the eye's retina as a model of brain tissue.

"Many people fail to realize that the retina, at the back of the eye, is actually a part of the brain and is remarkably accessible for study," he said. "It is the only portion of the living brain that one can directly see."

The brain contains a dense tangle of nerve fibers, often described as resembling a bowlful of spaghetti. But the retina, which corresponds to film in a camera and is about the thickness of wet tissue paper, has fixed boundaries.

"One can remove the retina, keep it alive, and do such things as count its neurons [nerve cells], study how they interact, and describe their physical structure," the neurophysiologist said.

"A principal advantage for the investigator is prior knowledge of the retina's role. As light passes through the eye and into the retina, signals emanate from its other end and travel to the main portion of the brain. The brain then uses these signals to help the body navigate in the world."

Dr. Masland believes that learning exactly how this intricate system works may help explain how other parts of the brain function.

"We know very little about what brain structures specifically do," he said. "If the hippocampus in the middle of a person's brain is damaged, for instance, one can predict that the individual will have learning difficulties. But that is a very vague statement. No one can exactly describe

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A Medical Partner Reaches a Milestone

Shortly after World War II, a newly created MGH Scientific Advisory Committee helped chart the hospital's postwar role in research.

High on the agenda of six eminent scientists—all from outside the MGH—was the question: Should the Massachusetts General Hospital accept financial and other support from the government?

Many hospital staff members were concerned that acceptance of such support would give public officials license to dictate the kinds of research the MGH should undertake and even how to conduct those investigations.

The advisory committee, whose members included a Nobel Prize winner as well as the president of MIT, espoused government assistance and rejected fears that interference would result.

The meeting in December 1947 forged a bond between the MGH, founded 176 years ago, and the government's National Institutes of Health (NIH), which this year is observing its 100th birthday.

Working hand in hand, the two venerable institutions have since pioneered many advances in health care through research and the training of young physicians and Ph.D.s in needed specialties.

Starting out as a one-room laboratory in the attic of a government hospital on New York's Staten Island, the NIH—then known as the Laboratory of Hygiene—has grown to an organization of 12,000

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MGH *News*

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EDITORIAL:

Health Care—the Road to Decline

The links between the National Institutes of Health and the MGH remain strong in this, the NIH's centennial year. Dr. James B. Wyngaarden, current Director of the Institutes, trained at the MGH. When Dr. Kurt J. Isselbacher, new Director of the MGH Cancer Center, wanted to learn the most promising innovative approach to cancer research, he spent his sabbatical in '84–'85 at Bethesda. Dr. Ronald W. Lamont-Havers, MGH Vice President for Research and Technology Affairs, was Acting Director of the NIH before coming to the MGH, and so on.

It would be nice to report that all is rosy in American science in this the anniversary year. A superficial look at biomedical research would make it seem that way. Americans still dominate in Nobel awards in medicine and physiology and remain in the forefront of biomedical discoveries and developments. Scratch the surface, though, and you find some disturbing signs. They include the quality of science education in high school and the dwindling number of college freshmen choosing to major in science.

That we as a nation may be entering a period of decline in American-led advances in health care research is in itself alarming. But there is a concomitant and probably related phenomenon. Fewer young people are entering medical school. Even more important, at least some people who serve on medical school admissions committees are convinced that the *quality* of applicants is also declining. If that anecdotal observation is proved true, American medicine itself faces a decline. We're talking now of a decline in the *quality of health care*. And the same numerical and perhaps qualitative decline may be impacting health care professionals like nurses, therapists, and laboratory technicians. We're describing now a pervasive degradation of care. Less bright professionals seem to be entering the pathway to the caring profession at the very time that medicine is so complicated that *brighter* students are needed.

Why: It does not require a Delphian oracle to respond. In an understandable desire to control medical costs, governmental and legislative leaders have intruded themselves into the control of medicine itself. Governments decide which hospital can obtain which new device and in some states how much hospitals can spend in a year. All over the nation, they determine how much can be spent on treating elderly patients with a given disease. Juries drive up the cost of malpractice insurance by awarding outrageous sums, sometimes for what is not true malpractice. And the patient has gone from the extreme of deifying the doctor to the other extreme of condemning the physician. These are some of the chasms along the highway to medical school. It is no wonder that dedicated physicians these days often grumble that they would not recommend a career in medicine to their own children. Nor is it any wonder that many of those children are listening. And yet, for all its present problems health care still offers young people the opportunity to make the difference in whether the sick will get well, and to develop new ways to cope with disease.

Medical Partner

(Continued from Page 1)

employees and a current annual budget exceeding $6 billion. Based in Bethesda, MD, the NIH devotes more than 80 percent of its budget to its extramural programs supporting health-related studies of nearly 20,000 scientists in 1,300 schools, hospitals, and other institutions.

The MGH has consistently been a leader among general hospitals in the receipt of NIH support. The MGH is currently awarded about $30 million annually in direct-cost NIH grants. That represents just over 60 percent of the hospital's total funding for research.

The close ties that developed shortly after World War II could not have come at a more appropriate time. Research funds for the hospital were then very limited. The hospital had engaged in wartime studies for the government, but with the return of peace the money, mostly from the Office of Naval Research and the Army, was drying up.

MGH staffers were coming home from military service anxious to learn how to apply the lessons of wartime medicine to peacetime patient care. Penicillin had been a wartime wonder, and a stream of other new antibiotics had followed.

At its initial conference, the advisory committee recognized an urgent need for new research facilities at the MGH to replace laboratories in cellars and other cramped quarters. The committee recommended construction of a building dedicated entirely to research.

Since the government was making construction grants available through the NIH, David C. Crockett, appointed in 1946 as the MGH's first Development Officer, began a series of trips to Washington. He obtained $700,000 from the National Cancer Institute and another $485,000 from the National Heart Institute to help finance a six-story Research Building.

Mr. Crockett insisted, however, that the money be awarded on a matching basis. The government grants alone, he said, would be inadequate. As it turned out, not only were sufficient public and private funds raised for the Research Building, dedicated in May 1951, but enough to also start work on the hospital's Warren Building, which opened in December 1956.

Photographs: Pages 1, 6, courtesy of Dr. Richard Masland; pp. 4, 5, Myron Daniels; pp. 7, 8, courtesy of Carol Gallagher

The Edwards Research Building provided facilities for studies relating to cancer, cardiovascular disease, and arthritis. The new 12-story Warren structure allowed for research in pathology, dermatology, neurology, neurosurgery, and psychiatry.

The NIH depends upon congressional appropriations committees for funding. When NIH budgets needed bolstering, some of the MGH's top doctors went before these committees to appeal for additional support of health care.

Supporters from the MGH early on included such noted physicians as Drs. Paul Dudley White, founder and for 34 years head of the Cardiac Unit; James Howard Means and Walter Bauer, both of whom served as Chief of Medicine; and Joseph C. Aub, who gained renown for research he conducted on cancer and on basic chemical processes of the body.

In 1948, Dr. White received an invitation to help shape the government's new National Heart Institute. In addition to being its Chief Medical Adviser and later its first Director, he became head of the National Advisory Health Council. The positions demanded so much of Dr. White's attention that in 1949 he decided to step down as Chief of the MGH Cardiac Unit.

Two New York philanthropists played a leading role in turning the attention of Washington lawmakers to important health issues. Albert and Mary Lasker had helped to reorganize the American Cancer Society (ACS) and were extremely active supporters of the NIH on Capitol Hill.

Mr. Crockett became acquainted with the Laskers through their attorney, General William Donovan, who was also president of the ACS. During the war, General Donovan headed the supersecret Office of Strategic Services. One of his top aides was then Major David Crockett.

On the nomination of Mrs. Lasker, President Truman named Mr. Crockett to a seat on the National Advisory Health Council. The Council gives final review to requests from individuals and institutions for extramural NIH research funds and submits recommendations to the Surgeon General and the Director of NIH. The law required appointment of a specified number of lay members. Mr. Crockett served on this council and also on the National Advisory Council to the Allergy and Infectious Diseases Institute for a total of 13 years.

Almost from the start of NIH's postwar disbursement of sizable grants for research and training, the NIH outstripped contributions from voluntary foundations.

When the Truman administration ended and General Dwight D. Eisenhower became President, fears were expressed that NIH disbursements would slow. But, except for during the Korean War, they did not. They accelerated, with help from people like the Laskers, Dr. Dean A. Clark, then MGH General Director, who had served earlier in the U.S. Public Health Service; and Dr. Paul Dudley White, who became President Eisenhower's cardiologist after his heart attack.

"We at the MGH receive support today from all of the institutes which make up the NIH," said Dr. Ronald W. Lamont-Havers, MGH Vice President for Research and Technology Affairs, and a former Acting NIH Director.

"NIH's biggest impact—and where much of its money is concentrated—is in research. The mainstays are grants to individuals or small groups of investigators. There are also program projects, or centers, supporting many people working together on a central research theme."

Dr. Lamont-Havers said that NIH training grants have had a tremendous influence in advancing the quality of medicine in America. Through training programs at hospitals like the MGH, physicians, as well as Ph.D.s, have learned how to conduct research in areas of special interest to them.

For many years, the NIH has also offered fellowships to young scientists for study at its big complex in Bethesda.

Dr. Steven M. Reppert, an MGH pediatrician, exemplifies such beneficiaries. He decided to become involved in research on completing three years of residency training in the MGH Children's Service. Although he had not chosen an area of study, he obtained a fellowship to train at the NIH's Institute of Child Health and Human Development.

It took only six weeks at the Institute for Dr. Reppert to decide that he wanted to study the body's circadian rhythms, or biological clock (*MGH News,* October 1979). This chemical ticking helps to regulate many basic elements of life such as the sleep-wake cycle and hunger.

"NIH provided one of the best intellectual environments to be found anywhere,"

(Concluded on Page 4)

Future of Science Needs Broader Support

Massachusetts leads the nation in per capita funding by the National Institutes of Health (NIH) for biomedical studies.

Research efforts in the state attracted more than $473 million from the NIH during fiscal 1986.

But although the extent of past government support gives Bay Staters reason to celebrate, particularly this year when the NIH is 100 years old, anxiety is being expressed over future scientific investigations.

Government funding for biomedical research has become unstable. In the mid 1960s, such studies accounted for five percent of the nation's annual health expenditures. Today, the figure has fallen to approximately three percent.

Dr. John T. Potts, Jr., Chief of Medicine at the MGH and Chairman of a Massachusetts committee organizing NIH centennial observances, expressed a twofold concern:

- "Young scientists complete their graduate studies only to find limited opportunities to pursue research careers in academic or government centers, particularly because of the uncertainty of stable funding for biomedical research. Unless this situation changes, we may soon find ourselves without sufficient experienced senior investigators to continue our scientific leadership in basic biomedical research into the next century.
- "High school students are generally not receiving an adequate science education. Most of our high schools are providing neither the foundation upon which science careers can be based nor the tools for general scientific literacy that technological leadership demands."

Recent reports indicate that fewer than half of the nation's high school graduates have studied science for even one year. In the last decade, the number of college freshmen choosing a science as a major has dropped 38 percent.

"In this centennial year," Dr. Potts said, "we are asking educators, legislators, policy-makers, and the media to help us focus public attention on the urgent need for renewed commitment to scientific research and to science education, particularly at the postgraduate and secondary school levels."■

NIH Backs a Wide Diversity of Studies

Virtually every major avenue of medical investigation at the MGH finds the National Institutes of Health (NIH) offering a helping hand.

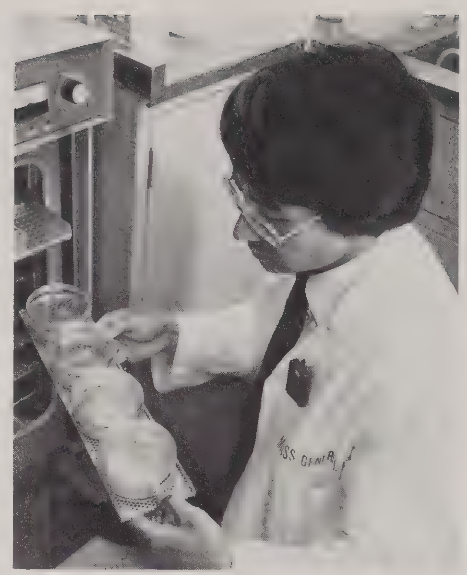
The battle against cancer has been attracting the most government support with heart, lung, and blood disorders following close behind.

A small sampling of studies undertaken at the MGH with full or partial NIH financial backing follows:

In the hospital's Cancer Center, a three-year, $1.2 million program is under way to determine whether interleukin 2, a chemical produced by the body's immune system, and white blood cells known as lymphocytes can counteract tumors and, if so, how the treatment can best be given.

In the MGH Gastrointestinal Unit and a laboratory near Paris, collaborating researchers have developed an assay employing a substance called monoclonal antibodies to detect primary liver cell cancer in its earliest, most treatable stages. Until now, the death toll from the disease hovers near 100 percent.

The NIH supports five laboratory research groups in the Department of Radiation Medicine. Their work is aimed at increasing the understanding of (1) the mechanism of thiol in the radiation effect on cells, (2) cellular sensitivity and metabolic activity, (3) the interaction of radiation and drugs with abnormally high body temperatures (hyperthermia), and (4) the radiation response characteristics of a malignant form of brain tumor in humans (glioblastoma).



In the MGH Cardiac Unit, Dr. Ban-An Khaw inspects a supply of monoclonal antibodies to be used in diagnostic heart studies directed by Dr. Edgar Haber, the unit's chief.

The department is very active clinically; it treats more cancer patients than any other hospital in New England.

In addition to grants that support individual laboratory teams, the department has a major grant for treating patients with atomic particles called protons as well as contracts for radiation therapy while a patient's body has been surgically opened, and for treatment planning.

Proton beam radiation therapy, performed at the Harvard Cyclotron Laboratory, is being evaluated by a team from the MGH, Massachusetts Eye and Ear Infirmary, and the cyclotron lab. The treatments have proved so successful in coping with cancer in an outer layer of the eye (choroidal melanoma) they have won government approval as regular care. The therapy has also been very successful in dealing with primary bone sarcomas of the base of the skull.

The technique has been extended on an investigative basis to treating such other cancers as incompletely removed meningiomas (situated in a covering of the brain), tumors of the thyroid, prostate, and salivary glands; those at the apex of the lung; acoustic neuromas, which develop on hearing nerves in the brain; and tumors close to the spinal cord.

Intraoperative radiation has proved to be particularly important in treating primary and inoperable cancers of the rectum.

The Orthopaedic Surgery Service has avoided numerous limb amputations by transplanting bone from deceased donors to replace cancerous bone in a patient's arm or leg. The MGH maintains a bone bank to preserve donor bone until needed.

In cardiology, the NIH provided initial funds for work leading to a test which helps assess the extent of a heart attack and whether surgical or nonsurgical treatment is appropriate. The speed and accuracy of the test, given within hours of an attack and involving monoclonal antibodies, can be lifesaving for thousands of Americans each year.

Medical Partner

(Concluded from Page 3)

Dr. Reppert said. "The only responsibility one had at the Institute was to conduct research."

After three years at NIH, Dr. Reppert returned to the MGH to continue his efforts.

In the eight years since he left Bethesda, Dr. Reppert's work has been supported by NIH, based upon grant applications that demonstrate the merit of his research, and he has become a highly respected scientist in his field throughout the United States.

Through the years, many MGH staff physicians have benefited from NIH training. To mention just a few:

Dr. John T. Potts, Jr., Chief of Medicine and former Chief of the Endocrine Unit. Working at the National Heart Institute for nine years and later at the MGH, Dr. Potts and coworkers greatly broadened the medical profession's knowledge about parathyroid hormone. Dr. Potts also developed at the MGH what fellow professionals regard as the most versatile, productive, and broad-ranging research unit in calcium and bone metabolism in the world.

Dr. Kurt J. Isselbacher, Chief of the Gastrointestinal Unit for the past 30 years and new Director of the MGH Cancer Center. During two years at NIH, Dr. Isselbacher made discoveries about galactosemia, an intolerance to milk, that led to ways of detecting the disease in newborns.

Dr. Edgar Haber, Chief of the Cardiac Unit. After three years of research training at the National Heart Institute, he returned to the MGH to accept his present post and launched training and research programs which have led to many advances in cardiology.

It is estimated that as many as 200 present MGH staff personnel studied at some time in laboratories of the NIH, and that an equal number served there in some other capacity, such as participation on councils or committees.

And the fears of the 1940s about government interference have proved groundless.

"NIH support has become such a dominant factor in biomedical training and research," said Dr. Lamont-Havers, "that whenever Americans concerned with health care hear suggestions of cutting back on these funds they complain bitterly.

"People today are comfortable with NIH support and by the end of the 80s I believe that industrial funding in the medical field will be accepted with the same confidence of freedom from outside influence."■

For nearly a dozen years, NIH has financed basic MGH research relating to heart transplantations. Under a five-year, $4.6 million grant, the program has been extended to include the MGH Departments of Surgery, Medicine, and Pathology, as well as the Children's Service. Among the goals is finding a way to prevent the rejection of heart and other organ transplants.

Like other departments, the Children's Service has conducted many government-supported studies. Major efforts have focused on developmental growth and metabolic problems in children and on embryologic and genetic disorders. One ongoing $5 million program has to do with intestinal immunity.

Specialists from several branches, including Medicine, the Cardiac Unit, and the Neurology Service, are engaged in a five-year, $1 million research effort to further decrease the threat of strokes.

The program involves assessing anti-clotting (anticoagulant) therapy for patients with a heart condition known as atrial fibrillation. The condition tends to cause a pooling and clotting of blood. A part of the clot may later tear free, travel to the brain, and block a cerebral artery. Centers throughout New England as well as the University of Utah and University of Pittsburgh have joined in the study.

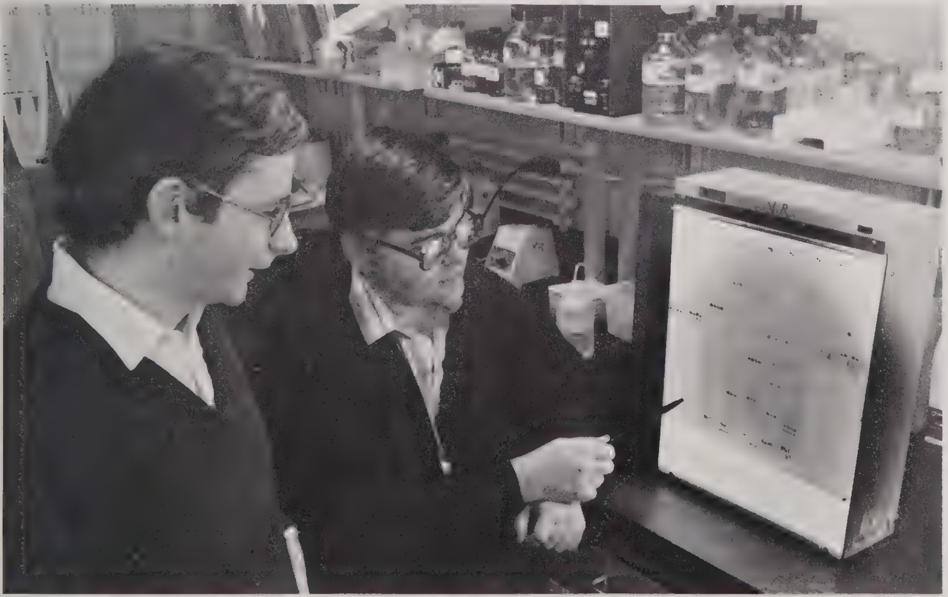
The MGH has maintained a Stroke Center since the early 1970s. Supported generously by NIH, the center enables neurologists, neurosurgeons, and neuroradiologists to join in the battle to avert or better treat strokes.

The center was responsible for establishing the first laboratory in the world for diagnosing carotid artery disease without going inside the head with instruments or radiation, and it also provided major contributions to create a PET (Positron Emission Tomography) Center at MGH.

With funds from the NIH and a private institution in France, Dr. Jack Wands of the MGH Gastrointestinal Unit, left, and Dr. Dominique Bellet of Paris helped discover a way to detect primary liver cell cancer in its earliest stages.

The PET Center offers important data on the physiologic function of patients. Its investigators conducted pioneering studies of the changes in blood flow metabolism which characterize stroke-prone and acute stroke patients.

The NIH has provided significant funding to the hospital's MRI (Magnetic Resonance Imaging) Program to evaluate both technical and patient care aspects of it and to train three Fellows a year in the new technology, which the MGH helped to pioneer. In addition, the hospital recently received NIH funds to expand basic research employing MRI spectroscopy.



Two MGH neurogeneticists, Drs. James Gusella, seated, and Peter St. George-Hyslop, played leading roles in showing that a defect on chromosome 21 causes familial Alzheimer's disease.

In July of 1980, NIH gave nearly $4 million to create in the Boston area a unique, multi-institutional "Center Without Walls" for the study and treatment of Huntington's disease, a fatal hereditary disorder characterized by involuntary movements, emotional disturbances, and intellectual impairment. The Chief of Neurology at MGH and at University Hospital in Boston were appointed Program Director and Associate Program Director, respectively. The grant was renewed in July 1985 for an additional $4 million.

Since the initial funding, a team of investigators led by an MGH geneticist discovered a long-sought marker for the Huntington's disease gene. A test is now given at MGH and two other major medical centers which can predict with up to 95 percent accuracy whether a person from an "at risk" family will ever suffer from the illness.

In the MGH Infectious Disease Unit, researchers with NIH support were the first to isolate the AIDS virus from human genital secretions, from spinal fluid, and from the brain of patients. Studies showed that the virus not only causes an immune deficiency but also a severe neurologic disease, thus requiring treatment with an antiviral agent that crosses the body's barrier into the brain. Antibody tests to help detect infections by the virus were introduced.

MGH endocrinologists have reported that preliminary trials of a potential new

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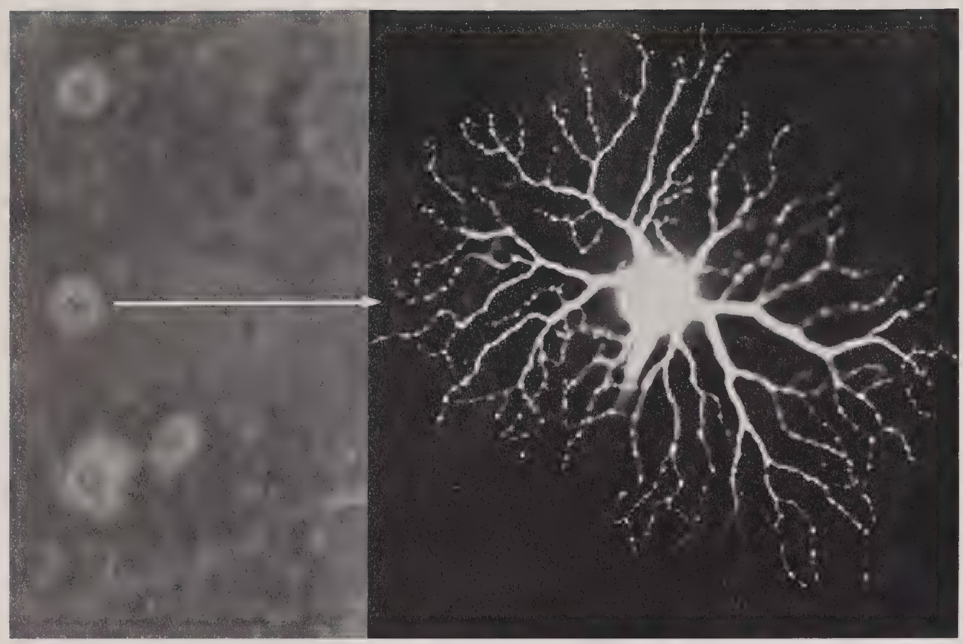

A technique devised in the MGH Neurosurgical Research Laboratory enables investigators to differentiate between a retinal nerve cell (see arrow) and other cells.

The Brain's Retina Acts Like a Computer

(Continued from Page 1)

the workings of the hippocampus."

In June, the National Institutes of Health honored Dr. Masland with a MERIT Award that automatically extended his current five-year, federally funded research grant to 10 years. The award represented peer recognition of the importance of his studies and his many contributions. By the conclusion of the extended grant, the MGH researcher will have devoted 24 years to these studies.

People tend to think that the retina contains a batch of photoelectric cells wired to the brain and relays pictures, much like television. But, Dr. Masland said, it is not as simple as that.

"Like much of the brain, the retina is a computer," he said. "Light-sensitive cells [called rods and cones] form a mosaic of images, but interconnected neurons behind them transform the images into nerve impulses. These encoded signals then travel along the optic nerve to the vision center of the brain where the signals are interpreted and the actual seeing takes place."

Dr. Masland came to the MGH in 1971 to work in the neurophysiology laboratory of Dr. Adelbert Ames III. Dr. Ames had discovered that retinas could be removed from rabbits and be kept alive in a dish. Dr. Masland was anxious to learn the technique. With control over a retina's environment, one could then gather data from the specimen with electrical methods or study its chemistry.

Over the years, Dr. Masland developed other new techniques for studying the retina. By employing four or five ways of focusing on the same goal, he could compare the results and conclusively verify or disprove hypotheses about the retina.

Dr. Masland found, for example, that by varying a retina's chemical environment, certain cells could be made to accumulate a radioactive substance. Radioactivity thereby facilitated the identification of functional subpopulations of retinal cells.

Director of his own laboratory since 1973, the MGH investigator and his colleagues also devised ways of making retinal cells fluorescent as a means of differentiating among neuronal groups.

One could say, in other words, that in studying a sample of spaghetti, instead of everything looking exactly the same, Dr. Masland has managed to color code the strands, making some red and some blue, and has been trying to determine where each goes.

To visualize the true shape of neurons, the MGH group also invented methods of injecting the cells with fluorescent markers.

"A neuron has a very complicated shape with what looks like twigs and branches running in all directions," he said. "If one used an ordinary histological [tissue] stain on it, however, it would look like any other cell."

Much of the work to date represents important progress toward finding out why the retina requires the number of cell types that it does.

Writing in the December 1986 issue of *Scientific American* on *The Functional Architecture of the Retina,* Dr. Masland reported that until recently it seemed that five classes of cells exactly defined the retina's functional elements.

"Each class of cells," he wrote, "was thought to carry out a single kind of task; to understand the retina's internal codes, neurobiologists should have only to decipher the interactions of these relatively few basic elements.

"Now, instead, it has become clear that the retina has many more than five functional elements. The five cell classes harbor subtypes so distinctive that the true number of functional elements may be as high as 50."

Dr. Masland described the retina as a triumph of miniaturization.

"All parts of the central nervous system operate under constraints of space," he wrote in *Scientific American,* "but rarely is space as limited as it is in the retina. There are two reasons for this: retinal cells must be packed together very tightly to maximize visual acuity, and the retina must be very thin so that light can penetrate to the rods and cones."

If cells in the retina of a human were the same size as cells elsewhere in the brain. Dr. Masland said, the human eye

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NIH-Backed Studies

(Concluded from Page 5)

technique for treating osteoporosis revealed a significant increase in the density of spinal bone among participating patients as well as better calcium absorption and total body retention of calcium. If later tests verify these results, the technique would be a major advance in treatment of the disease.

NIH grants helped a team from the MGH, MIT, and the Shriners Burns Institute in Boston to develop artificial skin in 1981. Since then, application of this skin has enabled many patients to recover from severe burns which otherwise were likely to have proved fatal.

And NIH financing enabled the MGH to report in late 1974 the development of an effective treatment for severe psoriasis. The government underwrites the cost of an ongoing trial at 16 medical centers to evaluate the long-term effects of the treatment called PUVA (Psoralen plus UV-A light). ■

would be almost the size of a tangerine.

This miniaturization is proving valuable in new research, specifically in an attempted three-dimensional reconstruction of functionally related groups of neurons with the aid of electron microscopy. The close packing of the retinal cells is allowing examination of entire retinal circuits and a start on building a model of the circuitry.

"The bottom line in trying to understand the structure of the retina is the complete reconstruction of the synapses [the links between the neurons]," said Dr. Masland, who is also Associate Professor of Physiology in the Department of Surgery at Harvard Medical School.

"People are now working toward construction of space-filling models, models big enough to let one walk around and point out the connections between one cell and another.

"Someday, we hope, investigators will be able to do that on neuronal circuits in the brain proper. Our own efforts will be focused instead on the fundamental cell biology of the nervous system; more specifically, how the cells affect each other biochemically."■

A Rare Disorder Can't Keep Ryan Down

Ryan Gallagher of Lowell has loved sports for as long as he can remember.

The 11-year-old, who donned his first pair of ice skates at the age of 5, can be found during the fall and winter playing for the Northern Middlesex Hockey Association.

Ryan is equally adept at center, right wing, or defense as the association's hockey teams compete with teams from many other communities.

During the summer, his fielding as a shortstop and his hitting consistently earn him a place on a Little League All-Star baseball team.

Albeit small for his age, Ryan leads a normal, happy, and healthy life. But this was not always so.

He was born with a rare physical abnormality which in the past was often mistaken for a condition treatable with over-the-counter medications.

Intestinal obstruction at the age of 9 months and later repeated episodes of constipation led MGH physicians to the discovery that he had Hirschsprung's disease, a congenital affliction that only surgery can correct.

Ryan Gallagher competes regularly in hockey tournaments.

Named after a Danish physician, Harald Hirschsprung, who described the malady in 1886, Hirschsprung's disease is a failure of nerve (ganglion) cells to develop in portions of the large intestine (colon) and sometimes in the small intestine (ileum) as well. Lack of these cells interferes with the squeezing action (peristalsis) that moves waste material through the bowel.

Hirschsprung's disease appears in about 1 of every 5,000 live births. In the United States, approximately 700 babies are born with the condition annually. Heredity is believed to be a factor in a small percentage of these births.

In 85 to 90 percent of Hirschsprung patients, only the rectum and an area directly above it (the sigmoid region) lack the nerve cells. In these so-called "short segment" episodes, the repair involves removing the affected bowel and pulling down healthy intestine for connection above the anus.

The operation—the first effective treatment for the disease—was developed in 1948 by Dr. Orvar Swenson at Children's Hospital in Boston and is performed worldwide today.

While Dr. Swenson's method takes care of short-segment patients, what can be done for the child who lacks nerve cells throughout the colon, from its first segment, the cecum, all the way to the rectum? Ryan Gallagher had this problem, called total colonic aganglionosis. Detected in only about 5 percent of Hirschsprung patients, it apparently accounted for the intestinal obstruction.

Dr. Samuel H. Kim, an MGH pediatric surgeon, operated on the boy's intestines. The technique he used involved taking healthy tissue from Ryan's small intestine, splitting it lengthwise, and then attaching it to similarly divided portions of his colon.

In effect, Dr. Kim created an intestine with ganglion cells on only one side. But that was sufficient to propel waste material through the bowel.

Although the abnormal portion lacks nerve cells, it assists in fluid absorption, an important intestinal function.

In a patient with such a reconstructed bowel, both the tissue with and without nerve cells develop as the child grows. But the part lacking the cells does not develop equally well due to spasticity.

"If you looked at a cross section of an ileum-to-colon segment several years after the surgery," Dr. Kim said, "you would see that three quarters of the circumference was now ileum and only one quarter colon."

Regardless of whether short- or long-segment disease is present, definitive surgery on a baby usually is deferred until 3–6 months of age. If already older when the condition is discovered, the surgeon may wait until the child's nutritional status has improved.

The surgeon, in the meantime, performs a colostomy, creation of a temporary opening from the colon to divert waste matter to a bag worn ouside the body. Babies with total disease involvement in the colon receive an ileostomy instead, the opening originating in the ileum.

In the classical form of Hirschsprung's, the disorder's presence may be suspected when a newborn fails to pass stools (meconium) within 48 hours of birth. The abdomen may become distended, preceded or accompanied by vomiting.

Twenty years ago, a Hirschsprung's diagnosis usually involved 4-, 5-, or 6-year-old children (predominantly boys) who suffered from severe constipation, interspersed with occasional diarrhea, and who exhibited signs of malnutrition. Their overall development fell far below their normal, peer groups.

"In those days, little was generally known about Hirschsprung's," Dr. Kim said. "Children who were constipated were simply given an over-the-counter medicine to treat that problem. A proper diagnosis frequently was not made until the patient's condition had become so severe that the individual had to be taken to a hospital with pediatric expertise."

Dr. Kim said that until the late 1960s

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Ryan's Disorder Calls for Expert Care

(Concluded from Page 7)

the diagnosis was made 100 percent of the time by studying muscle removed from the rectum. That required general anesthesia and hospitalization.

Then two new techniques made a diagnosis possible in an office setting. One method was a punch biopsy that enabled a physician to obtain rectal tissue from a patient. The tissue was then studied under a microscope for ganglion cells and any abnormal levels of an enzyme called acetylcholinesterase. The other technique was anal-rectal manometrics, a balloon study of internal rectal muscle pressure and relaxation.

"With these methods," Dr. Kim said, "we can make the diagnosis 99.99 percent of the time."

He emphasized that a child suspected of having Hirschsprung's should be brought to the attention of a pediatric gastroenterologist or pediatric surgeon for evaluation and treatment.

"The number of people really familiar with the disease is limited," he said, but he added, "Today, the surgery in the hands of those who do it regularly should be successful 100 percent of the time."

Ryan Gallagher was an unusual patient in that as an infant he had none of the customary symptoms, other than being very colicky. His bowel movements were satisfactory. His abdomen did not enlarge. And he did not vomit frequently.

Ryan's mother, Mrs. John (Carol) Gallagher, said the fact that he was breast-fed may have clouded the presence of the Hirschsprung's disease. It was not until the breast feeding stopped and Ryan began to eat solid food that he developed symptoms.

For about a year, Carol said, Ryan had multiple bowel movements daily, sometimes up to 17 in a single day. "My husband and I were up all hours changing, bathing, and feeding him," she said. But slowly he overcame his difficulties.

Today, in addition to playing hockey and baseball, Ryan enjoys skateboarding, tennis, and skiing. And he is an "A" student at St. Stanislaus Elementary School in Lowell.

A few years ago, his mother, her identical twin sister, Linda Bendzewicz of Lowell, and Betty Henry of Brattleboro, VT, organized the American Hirschsprung's Disease Association, Inc., to help parents of affected children better understand the affliction and to foster research. Mrs. Henry is president of the organization, situated at 22½ Spruce Street, Brattleboro, VT 05301. Membership exceeds 300 worldwide.

Linda had Hirschsprung's but underwent successful surgery. A 5-year-old daughter, Renee, was operated on by Dr. Kim at about 6 months for a form of the disease which not only involved her entire colon but also part of her small intestine. Betty Henry has a 5-year-old son born with long-segment Hirschsprung's.

A staff nurse who cared for the Henry and Bendzewicz children at the MGH has helped to swell the ranks of the American Hirschsprung's Disease Association. When Marlene Norton, RN, encounters a patient with the disorder, she makes the parents aware of the organization and the assistance it offers. She also alerts colleagues at other hospitals to the existence of the group.

Carol Gallagher said doctors believe she has fewer ganglion cells than normal, but if a shortage does exist, it has not caused any adverse effects.

Dr. Kim, who is also a Clinical Associate Professor of Surgery at Harvard Medical School, said that once Hirschsprung patients are treated successfully, few dietary restrictions are necessary.

"Some of the kids can't handle chocolate," he said. "Some have a lactose intolerance. But the majority do outgrow these problems. By their teen-age years, they can be found eating the same junk food that all teen-agers eat."■

Shortstop Ryan Gallagher (see inset) slides safely into home plate during a Little League baseball game.

MGH
News

Massachusetts General Hospital, Boston, Massachusetts Vol. 46 No. 8 November 1987

A Career in Nursing Often Proves Very Satisfying

America's hospitals are going through an unsettling time.

Along with sicker and older patients with greater needs in the hospital setting, the demand for experienced nurses exceeds the supply.

Deep concern is being expressed over the current national nursing undersupply because many more careers have opened to women, who make up 98 percent of America's nurses. Even in health care, more women are seeking to become doctors than nurses.

As a consequence of dwindling enrollments, many schools of nursing are closing. A few months ago, Boston University announced that it was ending its 46-year-old nursing program with its 350 students.

Most of the publicity about nursing focuses on nurses who are leaving the profession and people who are not entering the field. Little is written or heard about hospital nurses who enjoy their jobs, are satisfied with their salary and working hours, and who have found ways to overcome the inevitable stresses that sometimes arise.

The *MGH News* spoke with a cross section of such nurses from the hospital's staff of 1,100 RNs.

Anthony Pignone, RN, Head Nurse in the MGH's Inpatient Psychiatric Unit, said that while stress can be viewed as negative, it is not always bad.

"Stress can be very mobilizing," he said. "When a patient in an ICU [intensive care unit] begins to fail, for instance, the nurse mobilizes both physically and intellectually and strives for peak performance to save that life. The success that often results from what the nurse knows and does is the greatest unspoken reward that one can experience in nursing."

(Continued on Page 5)

Major Grants Spur Kidney Studies

The MGH is waging a major two-pronged campaign to better understand the way the kidneys work and to develop new treatments for diseases that sometimes disrupt kidney cells.

Thirty percent of the thousands of Americans who suffer from end-stage kidney disease, for instance, develop their condition as a direct consequence of diabetes.

The annual price tag for treating end-stage renal failure, including dialysis and transplants, approximates $2.8 billion. Public funds pay most of the bill.

On one front, work in the MGH Renal Unit is being supported by the largest single grant it has ever received, a five-year, $4.2 million award from the National Institutes of Health (NIH).

The grant will spur a broad study by basic scientists into the function of kidney cells in both health and disease.

A second program is blending the resources of the MGH with those of two other Harvard teaching hospitals in Boston—the Brigham and Women's and the Beth Israel—to focus entirely on the critical relationship between the kidneys and a specific disease, diabetes.

In this collaborative work, the hospitals' kidney units, functioning as the Harvard Kidney Center, are financed by a congressionally mandated $5 million NIH grant to Harvard Medical School.

The MGH investigators will move

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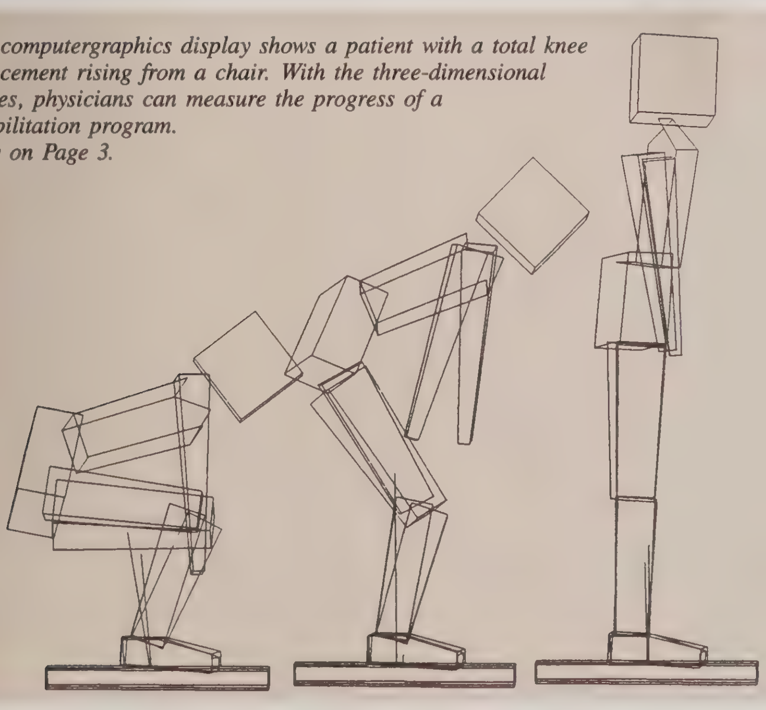

This computergraphics display shows a patient with a total knee replacement rising from a chair. With the three-dimensional images, physicians can measure the progress of a rehabilitation program.
Story on Page 3.

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EDITORIAL:

AIDS: Out of Tragedy Comes Good

Out of tragedy comes good. Some leaders in medicine have been arguing for transfusing blood in fewer patients. The concern was the small risk of contracting hepatitis from the transfusion. Even that small risk was not worth taking, the argument went, unless the need for the transfusion was critical.

Because of the proven life-saving value of transfusions, that argument was ineffective. As tests for detecting hepatitis in donated blood emerged, the message about using blood less became further diluted.

Along came AIDS. Because that disease has such dire consequences, physicians are rethinking their guidelines for using blood.

Doctors traditionally have provided transfusions for postsurgical patients with certain low blood values (a hematocrit of less than 30). Below 30 it was felt the patient's wounds might not heal, and the chance of infection would markedly increase. With physicians and patients concerned about AIDS, the caretakers are finding that the risks of less than 30 are not as great as feared.

At the MGH there has been a one fourth reduction in the use of red blood cells in any form since 1982. This reduction occurs at the very time the hospital is experiencing an increase of 8 to 9 percent in admissions. That means that if blood use had continued at the pre-1983 rate there would have been an increase of red cell use rather than a major reduction.

A similar reduction may also be occurring in other hospitals. Since national data in blood banking has about a two-year lag, it is difficult to be certain. Anecdotal information indicates that a similar phenomenon is at least beginning in an increasing number of hospitals.

One may thus argue this is another way in which the fear of AIDS has been positive.

Kidney Studies

(Continued from Page 1)

shortly to the hospital's new research center in Charlestown, a 10-minute drive from the main campus. The magnitude of the studies there will necessitate a 50 percent expansion of the renal unit's research staff, as well as collaboration with the MGH's Hematology–Oncology Unit, Diabetes Unit, and Pathology Department, directed respectively by Drs. Thomas P. Stossel, Joseph Avruch, and Robert T. McCluskey.

Ten or 15 years ago, scientists looked upon kidney cells as primarily sacs of water containing a variety of important proteins. They have since learned that these cells possess a dynamic internal structure.

"Each cell contains a web-like network of microfilaments which regulates the transport of proteins to the cell's surface," said Dr. Dennis A. Ausiello, Chief of the MGH Renal Unit. "The proteins then interact with other cell components to control the movement of fluids, salts, glucose, amino acids, and other substances, including waste matter."

The kidneys can either excrete or reabsorb substances depending upon body needs. If a person drank too much liquid, for instance, the kidneys would respond by stepping up excretion of water and salt. But consider a runner competing in a marathon on a hot day. The kidneys would react by reabsorbing as much water as possible to prevent dehydration.

These opposite effects are a result of complex interactions occurring at the cell surface. One of the roles of the microfilaments in kidney cells is to guide proteins to and from the cell surface where the proteins help mediate these interactions.

"The microfilament network interacts with vesicles [chambers] containing proteins to form a shuttle system," Dr. Ausiello said.

Any dysfunction of a kidney cell affects the way its proteins work, he said, and that is also true of all cell types in the body, whether they be in the brain, the liver, or the gastrointestinal tract.

"We're dealing with some of the most fundamental issues of how cells function," Dr. Ausiello said, "issues that cell biologists are just beginning to unravel."

Photographs: Pages 1, 4 (lower), courtesy of Dr. W. Andrew Hodge; pp. 3, 4 (upper), 5 (lower), 7, 8, Myron Daniels; pp. 5 (upper), 6, Eileen Farrell, RN

Implants Replace Worn Knee Joints

As aging occurs, the degree of wear and tear on the body can be devastating.

X rays of people more than 60 years of age show some evidence of arthritis in 97 percent of the studies. Half of those affected have osteoarthritis – a wearing away of the joints.

When such degeneration occurs in the knee – one of the body's principal weight-bearing joints – the effect can be both painful and immobilizing.

Development of the artificial hip after years of research revolutionized the rehabilitation of patients with arthritic hips (*MGH News,* May 1982), and after still longer studies, total knee replacements (TKRs) now offer as good relief to people with deteriorated knee joints.

Orthopedic surgeons worldwide perform an estimated 200,000 total knee replacements each year. Nearly half are done in the United States alone.

"Initially, knee prostheses were designed by physicians who lacked engineering degrees and thus did not fully understand the forces and materials that were involved," said Dr. Hugh P. Chandler who shares with Drs. W. Andrew Hodge and Stephen B. Trippel in performing many of the TKRs at the MGH.

As engineering input grew, so did appreciation of the importance of the anatomical shape of the implant and of perfectly aligning the components of the prosthesis. This has led in just the last half dozen years to special instruments that assure absolute accuracy in cutting bone and fitting it to metal.

The typical candidate for a TKR is more than 60 years old with severe joint destruction, limited knee function, and considerable knee pain. The affected joint may be so unstable that the knee tends to give way. Being overweight and/or having an injury in earlier years that required the removal of knee cartilage may have accelerated the patient's osteoarthritis. Such arthritic disorders as rheumatoid arthritis and lupus erythematosus may also lead to a TKR when conservative relief efforts fail.

What can a physician hope to achieve with a TKR? Drs. Chandler, Hodge, and Trippel all feel that pain relief and considerable functional improvement can be provided for 98 percent of patients under-

(Continued on Page 4)

One of the most common processes leading to kidney disease is the production of antibodies to proteins. The Renal Unit is closely studying a condition in which such antibodies appear and inhibit the ability of kidney cells to work.

Called membranous glomerulonephritis, the condition is a form of a disorder which damages the kidney's filtering apparatus. The illness is characterized by a swelling (edema) of the body's tissues and a large loss of protein into urine. Often the malady is associated with high blood pressure, a common result of many types of kidney diseases. Chronic kidney failure can occur, leading to a need for dialysis and/or transplantation.

Dr. Ausiello said that although it is a rare disease, membranous glomerulonephritis may typify what happens in many kidney disorders when proteins and antibodies interact.

He said that he and colleagues at the MGH are working toward purifying the protein involved in human membranous glomerulonephritis. This would be a major step toward understanding how the disease develops.

The kidney is packed with an enormous number and variety of cells. Only within the last decade have scientists learned how to isolate an individual cell from the organ, grow the cell in culture, and study it closely.

Dr. Ausiello's team has pioneered in this work. "We've developed a number of cell culture models," he said.

One such model involves culturing glomerular mesangial cells. These are important in the regulation of blood flow through the kidneys. Because blood transports whatever must be excreted or reabsorbed, mesangial cells are sometimes described as "guardians of the gate."

Of special concern to investigators, however, is the fact that the cells are particularly sensitive to the metabolic consequences of diabetes.

Two researchers at Harvard Medical School, Drs. Morris Karnovsky and Jeffrey Kriesberg, were among the first to culture glomerular mesangial cells about a decade ago. Dr. Kriesberg later joined the MGH Renal Unit and with Dr. Ausiello published the first reports concerning the functional activity of these cells in culture.

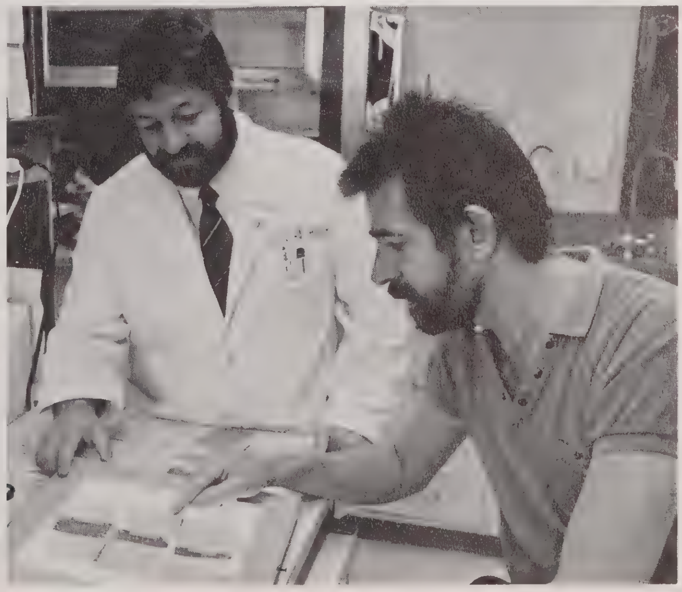
"The diabetic state, therefore, may be characterized in the kidney as a progressive loss of function of these and other cells in the glomerulus [the kidney's filtering apparatus]," Dr. Ausiello said.

"Such loss leads to glomerular scarring and eventually hypertension, chronic renal failure, and end-stage renal failure. The longer one has diabetes serious enough to require insulin, the more likely one is to develop these consequences."

Still another area of concern is impairment of the kidneys due to an illness elsewhere, particularly in the heart.

When the pumping activity in a person's heart falters, the ability of the kidneys to excrete salt, water, and other substances is hindered.

"The kidney cells are not abnormal in this case," Dr. Ausiello said. "They are simply receiving wrong signals from the heart. The more we understand about the reaction of these cells the easier it will be to formulate a treatment enabling the kidneys to overcome such faulty signals, whether they come from the heart or some other organ.■



Drs. Dennis Ausiello, left, and John Hartwig study films that offer three-dimensional views of kidney cell structure.

Knee Implants Benefit Older Citizens

(Continued from Page 3)

going knee replacement surgery.

Dr. Chandler told of an elderly lady with a knee joint so badly worn she could not walk 50 feet or climb stairs. After surgery, she could walk a couple of miles unaided and climb stairs using both legs alternately as a healthy person would. Her pain disappeared.

The MGH orthopedic surgeons emphasized that total knee replacements are meant to help people in their later years. “We feel very uncomfortable doing them in young people, just as we don’t like to do total hips in young folks,” Dr. Chandler said, “because of the unknowns in how long the prostheses will last and what the activity of young people will demand. The prostheses are not designed for tennis playing, jogging, or football.”

Dr. Hodge, who also directs the MGH’s Biomotion Laboratory, said walking may impose loads on the knees ranging up to several times body weight, but the highest loads most likely occur during stair climbing and rising from a chair.

In a healthy person, the ends of the thigh bone (femur) and main leg bone (tibia) are capped at the knee by articular cartilage described as three times more slippery than ice on ice. In addition to these surfaces on which the end of each bone can glide, the knee has other cartilage called menisci which cushion pressures within the joint.

With aging, the articular cartilage may gradually soften, roughen in places, and then tend to crack and wear. Excessive weight bearing or physical stress also takes its toll on the menisci.

Dr. Hodge described a TKR as basically a resurfacing operation which substitutes metallic components for the bad bone that is removed. A polyethylene spacer in between replaces the cushioning tissue.

One of the very first knee resurfacing techniques developed in this country was introduced around 1950 by two MGH orthopedic surgeons, Drs. William N. Jones and Otto E. Aufranc. They produced an implant which capped the knee end of the femur and was anchored in the thigh bone by means of a spike-like rod. Orthopedic cement had not come along yet. Although the device—called the MGH knee—helped some people, its use was eventually discontinued because no protection had been offered for the tibial end which also usually had some destruction.

This old device was often made from a cobalt-chromium alloy that is still used in the newest implant designs.

Every knee has two weight-bearing areas, the medial, or inner, compartment and the lateral, or outer, compartment. A third compartment accommodates the kneecap. Not every patient with knee arthritis needs a complete or tricompartmental procedure. People who are bowlegged sometimes wear out only the medial compartment while those who are knock-kneed occasionally erode only the lateral.

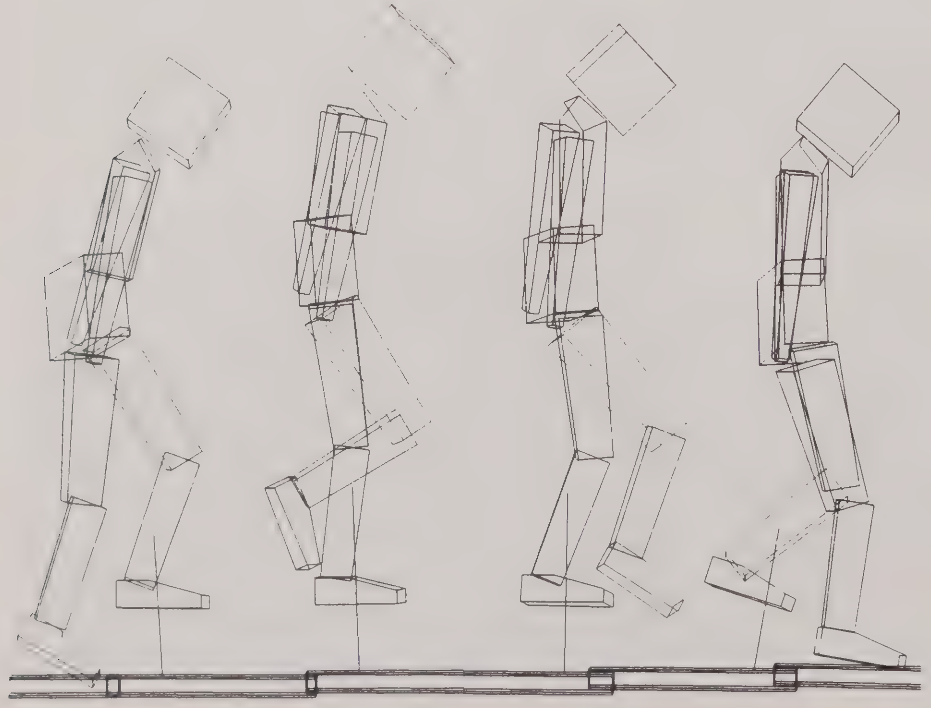
Components of a knee prosthesis next to a skeletal replica of a knee joint

A procedure which confines resurfacing to a single compartment has been developed, but only a small percentage of patients would be considered good candidates for this. Osteoarthritis or a trauma-induced arthritis may permit the limited procedure, but most other forms of arthritis, such as rheumatoid, typically involve an entire knee joint.

In installing a knee prosthesis, fixation is obtained most commonly with cement, but in the past couple of years fixation with bone ingrowth has become available. This method involves components whose inner sides are covered with porous surfaces, usually beads or wires fused to themselves and to the prosthesis. Within weeks, bone can grow into the caves, holes, and tunnels that were created, thus assuring a strong bond.

For a patient of advanced years, low exercise tolerance, and soft bone, chances are cement would be chosen because a well-cemented knee will probably last 10 years or longer. For a younger person, quite active with stronger bone, and likely to use the knee for many years, bone ingrowth might be more logical.

Patient motivation is vital for a successful TKR. Such patients have to work very hard after their surgery to achieve motion and strength, but the harder they work the greater the reward.



In this computergraphics display from the MGH Biomotion Laboratory, a patient with a total knee replacement climbs, then descends stairs to help doctors determine if full rehabilitation has been attained.

A Team Approach In Nursing Helps To Ease Stress

(Continued from Page 1)

It is prolonged stress, Mr. Pignone said; that can create a problem. If continually confronted with stress, the nurse is apt to begin feeling inadequate.

Multidisciplinary teamwork helps to prevent that. In the Inpatient Psychiatric Unit, teams comprised of physicians, nurses, social workers, occupational therapists, and mental health workers convene twice weekly to discuss patients under their care. This is in addition to daily conferences that a nurse may have with a physician to work out a patient problem.

Patti Rager, RN, Director of Nursing Support Services, said that at the MGH, where highly advanced medical technology is often brought into play, nurses can enjoy greater independence—and respect—than ever before because of their skills and the responsibilities they bear.

"Unlike physicians who see their patients only at specified times of the day, nurses are with patients around the clock," she said. "They're the ones who pick up any subtle changes that may occur and who initiate action before any emergency develops."

Mrs. Rager oversees Clinical Administration which handles the secretarial and administrative support system on patient care units. This service allows nurses to devote more attention to their patients.

Mrs. Rager said that during 16 years as a nurse some of her most satisfying experiences came in a burn unit.

(Continued on Page 6)

Marjorie Jordan, RN, with a young patient in the Pediatric Intensive Care Unit

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The mean length of stay for TKR patients at the MGH has been 12.9 days. After operating on a knee, the surgeons place a splint on the leg for 24 hours to immobilize it, lessening the patient's discomfort. Then the leg is put into a passive motion machine, a cradle-like device equipped with an electric motor which flexes the knee, at first gently, then with increased range of movement.

Before their hospitalization ends, well-motivated patients will ride a stationary bike five times a day, perform many knee thrust exercises each day while seated, put their leg up on a chair five or six times daily, and conduct other leg activities to keep the muscles strong.

Although many doctors prefer a formal physical therapy program at home, Dr. Chandler said the program he uses in the hospital is designed to enable patients to continue the exercises at home without a physical therapist. Usually, the patients rely on crutches for six to eight weeks. Then, if all is well, they advance to a single crutch or a cane.

Dr. Hodge is conducting studies in his Biomotion Laboratory to learn how to rehabilitate patients better and faster following knee replacement.

"Two years ago, we quantitated the results of total hip surgery and found that a year after their operation these patients could maneuver on stairs and from chairs as well as normals of their age," he said. "But this is not always so with patients who have total knee replacements. The knee is much more dynamic during such activities than the hip.

"During the past year, we studied five TKR patients, comparing them with normal counterparts, and found that although the patients were happy with their surgery and enjoyed very good function, they were using extra upper body momentum to facilitate their knee action."

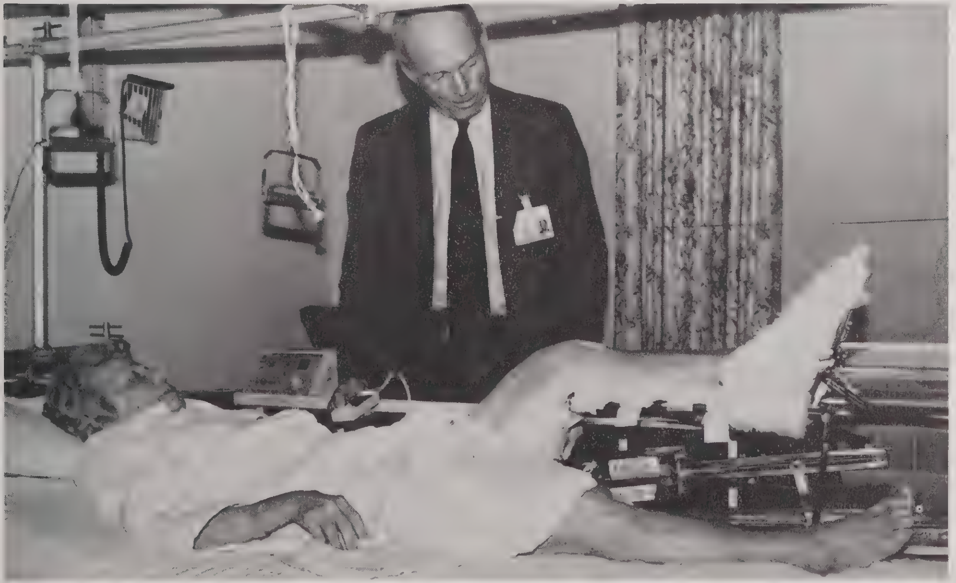
Further investigation suggests that the quadriceps muscle—the principal thigh muscle which extends the knee—often does not work quite as well in TKR patients as in normal persons.

Dr. Hodge believes there is a need for new and intensified rehabilitation techniques, such as the addition of functional electrostimulation and targeted physical therapy directed specifically toward the quadriceps muscle. In addition, he wants his laboratory to analyze a knee replacement design that would preserve a ligament (anterior cruciate) in the center of the knee joint to determine if this provides better knee function.

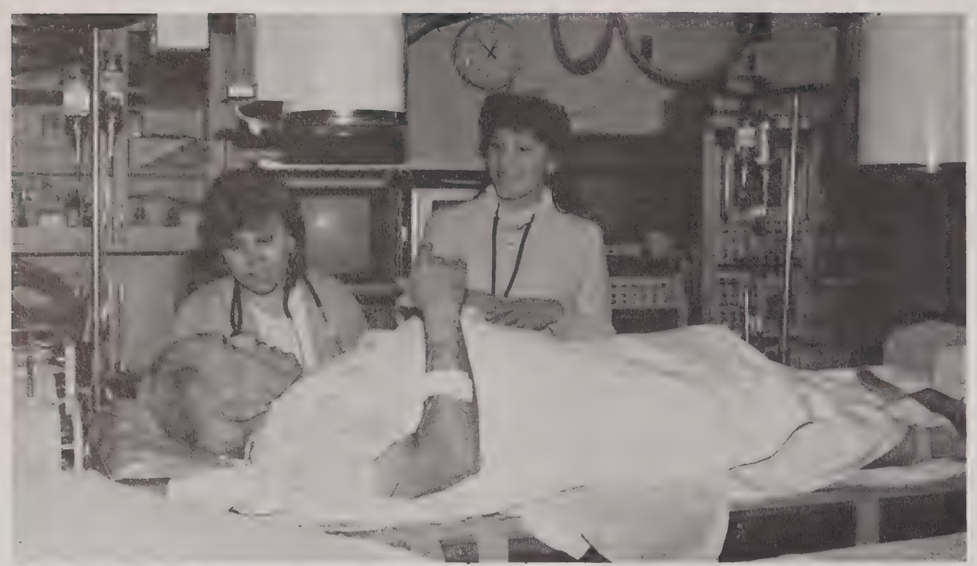
In the MGH's Orthopaedic Research Laboratory, a method is being sought to attack arthritis itself in its earliest stages.

Dr. Trippel is studying the action of cells in articular cartilage, the tissue destroyed by osteoarthritis, to better understand how they function.

"If these cells can be manipulated to repair the cartilage as soon as the damage begins," he said, "then theoretically we will have a means of avoiding the end-stage destruction that requires joint replacement."■



After receiving a prosthesis in her left knee, Celia Wells, 84, of Boston, exercises the knee in a passive motion machine as Dr. Hugh Chandler looks on. The patient went home only six days after her surgery.



Coronary Care Unit nurses Kathy Gonczarek, RN, left, and Nancy Caruso Laroche, RN, answer the questions of a patient in the Cardiac Catheterization Laboratory.

Nursing Stresses Often Bring Rewards

(Continued from Page 5)

"People think that burn nursing is constant sadness," she said, "but it is not. The nurse in the burn unit can actually see each day how treatments and dressings are helping the patient's skin to improve. It is also an area where nurses can put their entire range of nursing skills to work for patients.

"Many nurses prefer the long-term relationships they develop with patients on general patient care units. Primary nursing enables nurses to care for patients from admission through discharge. This can be very satisfying for nurses, patients, *and* patients' families."

Paula Carey, RN, has been a nurse in the MGH's Surgical Intensive Care Unit (SICU) for the past six years. Caring constantly for seriously ill patients can be very stressful, but Miss Carey can recall many instances of what she terms "instant gratification."

A patient who has just undergone heart surgery, for example, may arrive in the SICU at 7 p.m., still anesthetized, with a temperature of 90 degrees, and with tubes and wires connected to many parts of the body. By 7 the next morning, diligent nursing has rewarmed and stabilized the patient. He is awake, breathing without mechanical assistance, and can speak.

Well over 90 percent of SICU patients do well, but some need added attention to pull through. SICU nurses must also communicate with patients' families.

"It's very important to be honest with them," Miss Carey said. "If the news is bad, you still have to tell them, but you do try to judge their reaction to see just how much they can take at any one time."

Miss Carey eases the stress of her job by working a 36-hour week and packing all of that time into three 12-hour shifts over a three-day period. That gives her four days off. "Exercise is my way of taking my mind off work," said the 29-year-old nurse. "I like to jog and swim. I'm active all the time."

When patients who have had heart surgery leave the SICU, they are taken to an intermediate cardiac floor known as Warren–Baker 12. Although their invasive monitoring lines have been removed, they are still potentially unstable. If an emergency develops, nurses such as Eileen Jefferson, RN, are prepared to act quickly.

"In the event of ventricular fibrillation [irregular impulses in a heart's pumping chamber], we can try twice on our own initiative to defibrillate the patient," she said. "If those efforts fail, we must then await further instructions. Similarly, if a patient develops ventricular tachycardia [an abnormally rapid heartbeat], we can give a certain amount of lidocaine to help depress that speedup."

Usually, a physican is immediately available for consultation and to make treatment decisions. Medical residents who are new to the floor depend even more on the nurses for needed information.

Miss Jefferson, who became an RN four years ago and originally cared for cancer patients, knows nurses who have moved on to other jobs.

"The principal reason they left was burnout," she said. "They felt they could not give the quality of nursing care they wanted to because of either lack of staffing or time. Personal integrity was involved. When someone cannot perform to professional standards, a major internal conflict results."

The MGH's Newborn Intensive Care Unit (NICU) epitomizes the need for nurses with good interpersonal, communicative skills in addition to technical knowledge.

"A pregnancy is normally a joyful period," said Anne Armstrong, RN, one of 29 staff nurses in the NICU. "No one expects a crisis. When one does occur, such as a baby being born at 25 weeks and on the edge of viability, nurses not only care for the infant but also intervene with the parents to get them through the difficult time."

There is so much satisfaction, Ms. Armstrong said, in watching a baby come safely through a roller coaster kind of experience, get off a respirator, and soon go home well. During follow-up visits to the hospital, parents of such babies often bring them to the NICU floor so that the nurses can see how well the children are doing.

When babies in the NICU fail to survive, the nurses continue to provide emo-

Jean McAuliffe, RN, plays with A.J., center, and Melinda, long-time residents of a unit on the Children's Service.

Donating Own Blood For Future Surgery Becomes Common

An MGH program enabling patients to donate blood for their own benefit later in elective surgery has doubled in size in one year due in part to the fear of AIDS.

Of 25,500 units, or pints, of blood used at the hospital in the 12 months ending September 30, 1987, the "autologous" program accounted for close to 10 percent. In the previous year ending in September 1986, patients donated about 5 percent of the blood for their future surgery.

A person's own blood is safest for transfusion because it eliminates the risk to the patient of an infectious disease or an immunologic reaction.

Autologous blood banking, which is growing increasingly popular across the country, developed at the MGH long before anyone heard of AIDS.

The year was 1965. An 11-year-old boy from Maine needed surgery to correct a heart defect (*MGH News*, October 1974). Surgeons estimated he would require 10 pints of blood during the operation, but they could not use blood from others.

Autologous blood being put into a refrigerator by Dr. Charles Huggins can be stored safely in liquid form unless the patient's planned surgery is more than a month away. In that case, it must be frozen.

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tional support to the parents through a 12-week bereavement program that the nurses organized nearly five years ago (*MGH News*, December 1984). Through meeting with the support group, mourning parents find they can once again function effectively and enjoy life.

Rosalie Tyrrell has been a Psychiatric Clinical Nurse Specialist in the MGH Children's Service for the past 6 years, helping nurses to plan patient and family care when emotional and psychological issues are involved.

Someone once said to Ms. Tyrrell that as a consultant to other nurses her job must be very stressful because "you deal with everybody's stress." She responded:

"Burnout can happen to anyone, but it doesn't have to drive you out of the profession. One solution is to devote energy to projects of high personal interest such as bereavement support while at the same time handling the very thing that is causing stress.

"Also, whenever nurses sign up for a program, be it the bereavement group or an adolescent support group, I recommend that they commit themselves for only a certain period . . . six months or a year . . . to avoid possible burnout in that work."

When MGH nurses tire of a particular patient care unit, they are encouraged to seek transfer to another unit where they might find the work more interesting and challenging.

Every effort is also being made to provide more flexible working schedules. On some patient care units, nurses plan their own working hours, subject to approval by the head nurse.

"People entering nursing must realize that in many ways it is a selfless profession," Ms. Tyrrell said. "Up to a point, it has to be. If an issue such as stress were dealt with more in educational programs, nursing candidates would be better equipped to handle it in their careers. How to remain vibrant and enthusiastic in a profession that can sap so much of one's energy is a question that must be addressed early on."■

On Warren-Baker 12, an intermediate cardiac unit, Eileen Jefferson, RN, instructs bypass surgery patient Arthur Chatfield of Attleboro on the regimen he must follow after leaving the hospital.

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AIDS Fears Spark Giving of Own Blood

(Concluded from Page 7)

The boy's blood type was AB I-negative. Only two other people in the nation were known to have that type. Blood from any other individual could have provoked a possibly fatal reaction.

The solution was clear. Each month for one year the young patient donated a pint of blood to himself. Each unit was frozen for later use.

In 1970, another autologous technique called hemodilution was devised at the MGH to help a Jehovah's Witness youth who also needed open heart surgery.

Since religious tenets prevented him from receiving donated blood, even his own, MGH physicians collected a quantity of his own blood just before the operation but kept it in bags connected to the youth's body. During the surgery, the doctors infused the patient with a protein-free solution until major bleeding from the procedure was controlled. Then they allowed the boy's blood to flow back into his body.

This approach is also often employed now for people who are not Jehovah's Witnesses but whose blood requirements have to be reduced.

In addition to collecting blood for a donor's own later use in elective surgery, the MGH Blood Transfusion Service accepts blood donations for specific individuals from friends and relatives.

No evidence has been found that such designated blood is any safer than that collected from the community at large. But between 1986 and 1987, such donations rose even more than autologous ones—from 6 percent to 14.3 percent.

"There is absolutely no question that concern over AIDS led to both of these sharp increases," said Dr. Charles E. Huggins, Director of the Blood Transfusion Service. "It's an extremely rare day when one does not find an AIDS-related story in the news."

He said the odds are extremely remote that a transfusion will result in AIDS. "In fact," he said, "the entire country has had only a handful of documented AIDS cases occurring from blood collected after March of 1985 when the ELISA test [enzyme-linked immunosorbent assay] was licensed to detect antibodies indicating exposure to the virus."

Surveys show that 20 to 25 percent of the population still believe one can contract AIDS by donating blood, but Dr. Huggins said that is impossible.

"All instruments for collecting blood are steam autoclaved [heat sterilized]," he said. "They are never used more than once and are disposed of appropriately."

In conventional blood banking, the donor age generally ranges from 17 to 66, and an individual's donations are limited to one pint every eight weeks.

Such spacing of deposits is somewhat arbitrary, however, to make absolutely certain that people who take longer than others to regenerate donated blood can also give safely.

For autologous banking, more liberal rules apply. Contributions of one pint a week may be given to fulfill the customary reserve of three or four units for elective surgery. Also, such blood has been drawn at the MGH from patients as young as 13 and as old as 80, and some medical conditions such as cancer that are normally a cause for donor rejection are acceptable under the self-donated program.

The Blood Transfusion Service recommends that autologous donors take iron supplements. It also checks the percentage of red cells in their blood (hematocrit) to make sure that the levels are within normal limits.

Although the MGH encourages autologous blood donations, the personal physician of the patient must first approve.

The periodic giving of blood need not take place at the MGH. Arrangements can usually be made to have the blood collected at a center near the patient's home and then shipped to the MGH's Blood Transfusion Service. ■

BLOOD FOR AUTOLOGOUS TRANSFUSION

Patients giving blood for use during their own elective surgery have had it shipped to the MGH from many parts of North America.

MGH News

Massachusetts General Hospital, Boston, Massachusetts Vol. 46 No. 9 December 1987

When Inflammatory Disorders Wrack the Intestines

Just about everyone has been laid low at one time or another by a disorder in the digestive tract.

Some of these maladies cause only fleeting distress. Others yield readily to medical or surgical intervention.

Still others are so unpredictable and damaging in their assault upon the body they still pose a major challenge to doctors.

High on the list of such disruptive and difficult-to-treat illnesses are two chronic disorders of unknown cause—ulcerative colitis and Crohn's disease, the latter also called ileitis and regional enteritis. Collectively, they are referred to as inflammatory bowel disease (IBD).

At least one million Americans suffer from IBD. When stricken, 75 percent of patients are under 40 years of age; 10 percent are under 16. Some children under 10 are affected.

Heredity is believed a factor in 1 of every 10 IBD cases. East European Jews appear more susceptible than other ethnic groups. Although in the past IBD has occurred infrequently among Orientals and Blacks, an increased incidence in those populations has been noticed of late.

Since the two illnesses exhibit similar symptoms, e.g., diarrhea, abdominal pain, fever, and loss of weight, physicians used to be hard-pressed to make a definitive diagnosis.

Early on, they regarded ileitis as a variant of ulcerative colitis in the lower digestive tract. Then in 1932, a paper authored by Dr. Burrill Crohn, a gastroenterologist at Mt. Sinai Hospital in New York, and two colleagues, Drs. Gordon D. Oppenheimer and Leon Ginzburg, described the distinctive features that made ileitis a separate entity. It became known as Crohn's disease.

(Continued on Page 2)

Caught in the Doldrums of Winter

Thousands of Americans are girding for new episodes of the blues.

It happens to them yearly as the short days and long nights of winter draw near.

Irritability, boredom, lack of energy, a tendency to oversleep and overeat, frequent confinement to the home because of the weather . . . in short, depression.

Doctors have attached a name to the condition: Seasonal Affective Disorder Syndrome (SADS).

In the late 1800s, Dr. Emil Kraepelin, one of the founding fathers of psychiatry, wrote of a predisposition among some people to become gloomy with the onset of winter and cheerful, even more than usual, as sap begins to flow from trees in the spring.

Not until recently, however, did the profession formally recognize the syndrome. In its revised Diagnostic and Statistical Manual (DSM-III-R) published this summer, the American Psychiatric Association for the first time established criteria as to what constitutes SADS.

Dr. Martin B. Keller, Director of Outpatient Research in the MGH Psychiatry Service, said that to be diagnosed as having SADS, a patient must have:

- experienced episodes of depression within the same 60-day fall or winter period during three years, at least two of them consecutive,
- endured at least three times as many instances of depression within that two-month time frame as during other times of the year,
- recovered from the depressive states during another 60-day period occurring at the same time during each of the years in question.

Individuals are excluded if there is an obvious effect of seasonally related stress, such as being unemployed every winter.

Psychiatry lists nine characteristic symptoms of depression. The depressed SADS patient must have any five of those symptoms for at least two weeks.

"We find that three or four particular symptoms stand out in seasonal affective disorders," Dr. Keller said. "SADS patients typically sleep and eat more than usual and gain weight. They also have a real sense of loss of energy."

More than nine million Americans suffer from major depression (*MGH News*, November 1984). Of this number, it is estimated that up to five percent, or 450,000 people, may have SADS.

Dr. Keller, who is also Associate Pro-

(Continued on Page 4)

Fit for neither man nor . . .

MGH *News*

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EDITORIAL:

Changing of the Guard

Changing of the guard in an academic institution is a time for nostalgia and hope. The nostalgia emerges in saying good-bye to one leader; the hope for the future in the person of the successor.

With the "retirement" of Thomas Bernard Fitzpatrick as Chief of Dermatology, the MGH looks back to memories of an outstanding career. It would be difficult to find another dermatologist who has so dominated the field over the last 28 years as has Dr. Fitzpatrick. His ability to diagnose and treat skin disease from acne to melanoma has been legendary. His patients range from the waiter to the Academy Award winner. His pupils serve with distinction around the world. And his research has encompassed major advances. As a Page 5 article demonstrates, his hospital, medical school, patients, and pupils are most fortunate. While he has relinquished his chiefship, he will continue his other roles.

John Albert Parrish assumes the post as Chief with a trail of accomplishments and a vision of the future. As his nonscientific books demonstrate, Dr. Parrish is a man of letters as well as medicine. He is a world leader in the understanding and use of light for medical applications. Ultraviolet light in its various lengths and laser light in its various energies are among his special interests. His achievements have already resulted in improved treatments for tens of thousands of people and promise much more. Even internal cancers—beyond the realm of most dermatologists—may yield to the team he has assembled.

Dr. Parrish, Dr. Fitzpatrick, and Dr. Madhukar A. Pathak pioneered the new field of photochemotherapy when they developed PUVA to treat stubborn, widespread psoriasis. Photochemotherapy combines the use of artificial light and drugs to treat disease. With that combination, the possibilities of attacking disparate ailments are widespread. And with the combination of Chief and former Chief, the MGH and its patients have retained a dynamic presence.

Intestinal Disorders

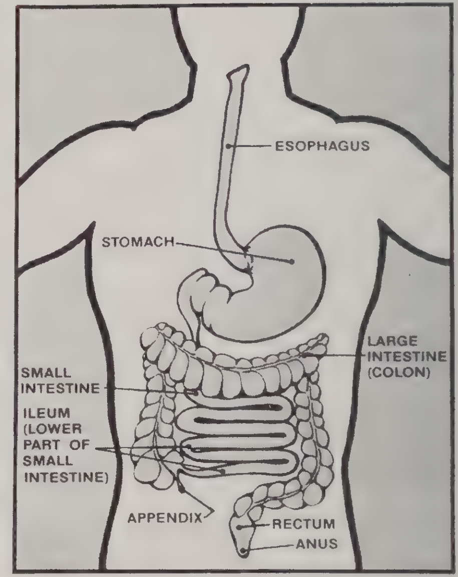
(Continued from Page 1)

Ulcerative colitis traumatizes the inner lining of the 5-foot-long colon (the large intestine) and the rectum with inflammation spreading uniformly.

Crohn's disease was once believed limited to the 3- to 4-foot ileum portion of the small intestine, but this disorder can affect the colon as well as any other part of the digestive tract. Inflammation from this malady may pierce every layer of the intestinal wall, but unlike the uniform nature of its IBD cousin, Crohn's disease tends to skip areas.

Patients with either disease have an increased risk of developing colon cancer.

Two drugs commonly prescribed for ulcerative colitis and Crohn's disease are sulfasalazine (an antibiotic containing sulfa and a form of aspirin called 5-aminosalicylate) and prednisone (a synthetic cortisone). Although effective, they can present serious drawbacks.



The Digestive System

"The side effects of sulfasalazine are usually due to the sulfa component," said Dr. Kurt J. Isselbacher, Chief of the hospital's Gastrointestinal Unit and Director of the MGH Cancer Center. "In some patients, the drug can lead to allergic reactions, nausea, headaches, and skin rashes.

Photographs: Pages 1, 4, 5, Scott Davis; pp. 3, 6 (lower), 7, 8, Myron Daniels; p. 6 (upper), Chris Maynard

Drawing: Page 2, courtesy of National Foundation for Ileitis & Colitis

Dr. Kurt Isselbacher studies colon cells in culture to determine the factors that influence their behavior.

"Medicines are being developed to eliminate the sulfa and, with different release mechanisms, enable the aspirin portion to reach the site of the disease more satisfactorily."

As for prednisone, Dr. Isselbacher said this steroid can present a host of adverse side effects, e.g., fluid retention, reduction of hair, thinning of skin, elevated blood sugar, greater susceptibility to infection, easy bruising. One of the principal concerns, he said, is a thinning of bone, especially in women. Loss of bone is not reversible.

Dr. Isselbacher, who is also Mallinckrodt Professor of Medicine at Harvard Medical School, said a prednisone-like drug is being developed which appears to have many of prednisone's anti-inflammatory effects but without its adverse side effects.

"The MGH is involved with other centers in preliminary trials with the drug, which is administered once daily by enema," he said. "It's too early to predict how valuable the drug will be."

One of the confounding aspects of IBD is its unpredictable behavior. Remissions are common and, in fact, patients may experience no symptoms for years only to fall ill again.

In children, growth failure can be the earliest clue of IBD with the disease itself going unsuspected until additional signs appear, perhaps months later. Growth failure occurs in about 15 to 30 percent of children with IBD when the onset is prior to puberty.

Dr. Isselbacher attributes the growth problem to both the disease involved and lack of nutrition.

"Even when one takes in a good supply of nutrients, the disease hampers the body's absorption of them," he said. "And because there is an active inflammatory process taking place, the body is also burning more calories than usual."

When medicines fail to control ulcerative colitis or Crohn's disease, surgery may be the only alternative, both for children and adults.

Removal of the colon eliminates the ulcerative colitis, but the patient customarily undergoes an ileostomy, a surgical procedure designed to permanently divert waste to a bag worn outside the body.

Drs. Daniel Podolsky, left, and Shinya Koyama discuss patterns of intestinal disease proteins detected by X-ray film.

Dr. Isselbacher said surgical procedures are being devised whereby the small intestine is attached directly to the rectum. The rectum then serves as a kind of reservoir for the waste.

In the case of Crohn's disease, an operation to eliminate diseased or abnormal tissue can markedly improve the quality of a patient's life, but the surgery is by no means a cure since Crohn's often returns eventually at another intestinal site.

The possibility of cancer is much higher in ulcerative colitis than in Crohn's disease. Researchers, therefore, are redoubling efforts to learn not only the cause of each illness but also how each differs in its course of development.

Dr. Isselbacher, who formerly headed the Advisory Committee of the National Foundation for Ileitis and Colitis, said a hallmark of Crohn's disease, or ileitis, is a presence in the gastrointestinal tract of granulomas, microscopic clusters of cells often having disease-hunting macrophage cells at the center.

Indicating presence of an infection, granulomas show up in 40 to 50 percent of Crohn's patients but never in people with ulcerative colitis.

Granulomas are typically seen in tuberculosis. Dr. Isselbacher said recent research has raised the possibility that Crohn's disease may involve a tuberculous-like microorganism.

"This would be difficult to prove," he said, "but it would not surprise me, considering the behavior of Crohn's, namely its chronicity, exacerbations and remissions, and tendency to recur at other sites, as well as presence of the granulomas."

Three years ago, Dr. Daniel K. Podol-

(Concluded on Page 4)

The darkness, snow, sleet, and cold of winter can easily lower one's spirits.

Mania May Accompany Winter Depression

(Continued from Page 1)

fessor of Psychiatry at Harvard Medical School, said that only about 200 individuals with confirmed SADS have come under careful study by research groups. Although their approaches have sometimes varied, they have reported a surprisingly consistent finding.

"More than 90 percent of the depressed patients also had episodes of mania in the late spring or in summer," Dr. Keller said. "Of this group, approximately 80 percent had what we call hypomania, a sort of reduced or laid-back mania."

In full-blown mania, a feeling of euphoria is noticed far out of proportion to what is going on in a person's life. Suddenly, as a result of pressure of some kind, the euphoria changes to hostility, even paranoia [a condition marked by delusions of persecution or grandeur]. In almost every instance, the illness requires treatment with mood-altering drugs and often leads to hospitalization.

In contrast, Dr. Keller cited this example of a SADS patient with hypomania:

"The patient typically awakens bright-eyed, cheerful, enthusiastic, energetic, anxious to get chores done. She prepares breakfast for the family but as she is washing the dishes, she hears a comment, 'That was great, but you cooked the eggs too long.' The patient's general feeling of well-being quickly fades. She becomes upset, irritable, snaps repeatedly at others . . . hypomania.

"Sometimes the condition lasts for two or three weeks, but usually it ends in just a few days with the patient regaining a normal, more pleasant disposition."

In medical parlance, major depression coupled with full-blown mania is called a bipolar I disorder. The depression and hypomania seen in most SADS patients is regarded as bipolar II. The American Psychiatric Association's annual review of psychiatry for 1987 contains a chapter by Dr. Keller on bipolar disorders.

It is interesting, he noted, that in the general population bipolar I is much more common than bipolar II, but that in individuals with SADS the reverse is true.

"We think there is good evidence to suggest that hypomania may not be just an attenuated or mild form of mania," he added. "Hypomania may one day prove to be an entirely different condition with a distinct genetic linkage of its own."

Dr. Keller said, however, that the condition may develop into a full-blown manic episode; thus, hypomania should be recognized and people should seek a specialist rapidly.

At the same time, he cautioned doctors to exercise restraint in coping with hypomania. "Every flu does not lead to pneumonia," he said, "and every chest pain is not a ticket to a coronary care unit."

The MGH psychiatrist said that each year during his first four weeks back from summer vacation he receives calls from people throughout New England who have suffered in the past from SADS. They anticipate it coming on again and seek help to ward it off.

The syndrome frequently begins with a sense of despair. The people affected start to worry about their health, family, work, projects they began but did not finish.

Of the 200 patients studied in the world's literature on SADS, 67 percent had at least one close relative with a major affective disorder. However, only 17 percent of SADS patients had kin who also had SADS.

A half dozen years ago, the peak age

Intestinal Disorders

(Concluded from Page 3)

sky of the MGH Gastrointestinal Unit discovered a biochemical defect in ulcerative colitis patients that does not appear in patients with Crohn's or other intestinal diseases.

The defect is in one of six different types of mucin (mucus-type proteins) that normally form a protective coating on the lining of the colon. The partial mucin breakdown allows other substances to come in contact with contents of the bowel and initiate inflammation.

Dr. Podolsky's study showed that the mucin defect was present even in non-diseased areas of the colon and persisted when the patient's colitis was in remission.

The continuing study of ulcerative colitis led to an animal model. With support from the National Institutes of Health, MGH and other scientists at the New England Regional Primate Center in Southboro, Mass., have been investigating a disease in cottontop monkeys that is strikingly similar to ulcerative colitis.

Just as in humans, the animals either respond to the customary drugs for inflammatory bowel disease or go on to develop cancer.

It has turned out that the monkeys also have a defect analogous to the one found in humans. Since the animals at the primate center had been bred in captivity, Dr. Podolsky recently traveled to Colombia to study cottontops captured in the wild to determine if those also develop ulcerative colitis. If they do, he will check next to see if they also have the mucin defect.

While the defect itself may not be a cause of ulcerative colitis, it may help point the way.■

A Pioneer in Curing Diseases of the Skin Earns Many Honors

They came not only from every corner of the United States but also from Europe, Asia, and South America.

Close to 200 people, most of them his former students, attended a three-day symposium in Boston in September of 1982 to pay tribute to Dr. Thomas B. Fitzpatrick.

As Chief of Dermatology at the MGH and Chairman of the department at Harvard Medical School since 1959, Dr. Fitzpatrick had supervised the training of 138 dermatologists. Twenty-four had become full professors or department heads themselves, and 41 others were also active in teaching.

This output of dermatologists in academia surpassed that of any similar training program in the country.

Since the symposium, at which many of Dr. Fitzpatrick's former students reported on their own investigations in the field, tributes to the noted MGH physician, researcher, and teacher have continued to flow in.

A Thomas B. Fitzpatrick Professorship in Dermatology was established at Harvard Medical School. Funded at $1.5 million by the doctor's patients, students, and friends, such an honor for one still on the active faculty is rare.

By direction of its Emperor, Japan this year awarded Dr. Fitzpatrick the Order of the Rising Sun, Gold Rays with Neck Ribbon, for contributing to the advancement of science in Japan.

(Continued on Page 6)

Laser Power Lifts Prospects for New Medical Advances

Specialists in treating skin disorders are broadening their role in health care by adapting new technologies in their field to combat other forms of disease.

The power of laser light, for instance, has fragmented kidney stones in 130 patients at the MGH.

Approved for patient care one year ago by the federal Food and Drug Administration, the procedure, developed in the MGH's Wellman Laboratories of Photomedicine, is offered routinely today at a dozen medical centers across the country.

Scientists in the Wellman labs are now trying to devise ways of solving cardio-

(Continued on Page 7)

for the onset of a major depression, including the depression component of SADS, was thought to be in the late 30s or early 40s. Today the consensus is that the early 20s is the peak age, and that a high risk for developing major depression can be detected in people as young as 15.

The National Institutes of Health recently awarded the MGH more than $700,000 to study the development of various kinds of depression in children and adolescents. Dr. Keller is the principal investigator on this three-year project which builds on research conducted at the MGH since 1979 in collaboration with Drs. Philip W. Lavori, William R. Beardslee, and Gerald L. Klerman.

The decrease of daylight in the winter has produced one of the leading hypotheses as to what might be a biologic mechanism relating to SADS. A small structure in the center of the brain called the pineal gland produces a hormone, melatonin, mainly at night in response to signals from a so-called biological clock elsewhere in the brain. Studies indicate the hormone relays information on changes in the duration of the daily light-dark cycle (*MGH News,* October 1979). Theoretically, an increased output of melatonin due to less daylight might throw off hormonal rhythms in the brain.

To counter this, some SADS patients altered their environment by adding bright, white lights to extend winter's daylight. Dr. Keller said that responses were noticed after two to four days of the light treatment.

Thoughts of spring soon to come make winter somewhat more tolerable.

"The patients did best if they continued treatment for a couple of weeks," he said. "Those who discontinued the treatment after getting an initial response found their depression recurring within another two to four days."

Some reports have told of relief from SADS by changing latitude, traveling in winter from a northern state with short days to a southern clime with longer ones. The problem with a study of this kind is that if a patient went south for a vacation, then the question arises: Was it the good time or the longer days that led to the individual's sense of renewed well-being?

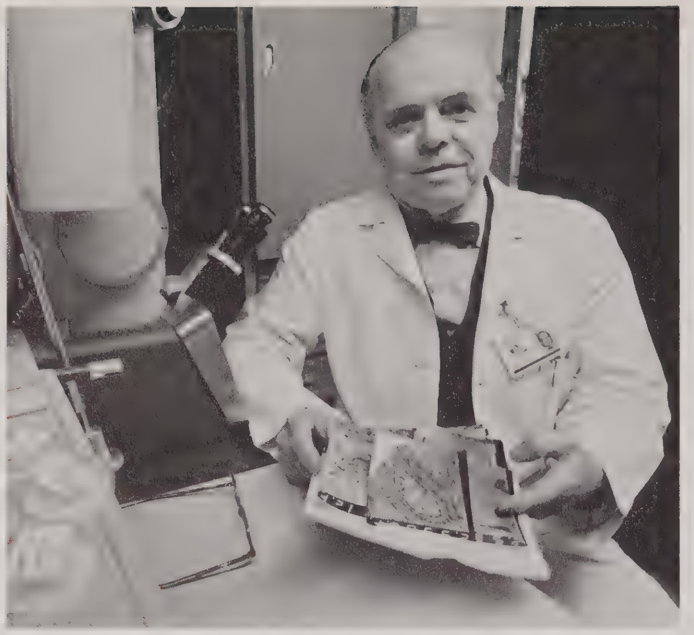
In general, Dr. Keller prescribes for SADS the same medications that he does for major depression and mania, such as a tricyclic antidepressant or an MAO (monoamine oxidase) inhibitor for the depression and lithium carbonate for the mania. But use of the drugs is limited to match the annual pattern of the disorder. Once the drugs are stopped, the SADS patients are followed very carefully to make sure that they do not relapse.

"It would be a mistake not to prescribe a medication," Dr. Keller said, "because we do know that depression and mania have a way of feeding on themselves. SADS could evolve into a chronic depression or chronic mania."

SADS patients also are urged to stay active. Develop more social activities, greater interests in music and the arts, new hobbies, wider patterns of exercise.

"The point is don't let the condition overwhelm you," Dr. Keller said. "When it gets dark at 4:30 or 5 o'clock, your lights shouldn't go out too."■

Dr. Thomas Fitzpatrick emphasizes that people should learn the warning signs of skin cancer.



Dr. Fitzpatrick Entered a "Primitive" Field

(Continued from Page 5)

Also recently, at a convocation at its medical school in Worcester, the University of Massachusetts conferred upon Dr. Fitzpatrick an honorary degree of Doctor of Science.

Having reached 68 years of age, Dr. Fitzpatrick turned over his long-held MGH and Harvard reins this summer to a veteran colleague, Dr. John A. Parrish (See story on Page 5), but anyone who thinks that this has lightened Dr. Fitzpatrick's work can guess again.

In addition to still treating patients, engaging in research, and teaching as Harvard's Wigglesworth Professor of Dermatology, the author of nearly 300 scientific publications is busy working on his 12th book.

It will be a companion volume to his *Color Atlas & Synopsis of Clinical Dermatology,* already reprinted five times since being published in 1983. The new book will deal with more serious skin disorders.

Dr. Fitzpatrick is especially noted for his *Dermatology in General Medicine,* a 2,500-page textbook used in medical schools worldwide. A third edition of the book, originally published in 1971, appeared this year.

A graduate of the University of Wisconsin, A.B.; Harvard Medical School, M.D., and the University of Minnesota, Ph.D., Dr. Fitzpatrick focused on dermatology because in the 1940s it was a "primitive" field and represented a challenge.

"There were a lot of skin disorders that no one understood," he said. "Thus there were no treatments. Antibiotics were not yet available."

He said he always had a keen memory for things he saw, and he wanted to utilize this talent. "I also felt," he said, "that if one went into something that had not yet been developed, even though one were no better than the next person, hard work would provide more opportunities 'to till the fields.'"

A two-year stint in the Army also whetted the doctor's appetite for learning more about skin diseases. While assigned to the Army Chemical Center in Maryland, he met Dr. Aaron Lerner, later to become Professor of Dermatology at Yale. Together they developed a research interest in melanin, the pigment formed in special skin cells called melanocytes. This pigment accounts for color differences among humans.

The Dermatology Ambulatory Care Unit offers a wide range of procedures, including surgery to remove skin tumors.

"We had a sort of naive, idealistic view that we wanted to solve a cancer problem," Dr. Fitzpatrick said. "We thought that if we could fully understand the chemistry of melanocytes we might be able to figure a way to stop the cancer [melanoma] that sometimes erupts from those cells."

Drs. Fitzpatrick and Lerner proved that the enzyme tyrosinase existed in human skin and that it converted the amino acid tyrosine into melanin in the melanocytes. They showed further that tyrosine is active all the time in the melanoma; thus this was a way to differentiate between the malignant cell and the normal one.

Dr. Fitzpatrick pursued his tyrosinase research in the 1950s, including six years during which he served as head of dermatology at the University of Oregon Medical School. When he came to the MGH and Harvard in 1959, he turned to what he thought might be a quicker approach in curbing melanoma—prevention through early detection.

Criteria for an early diagnosis of primary melanoma were established at the MGH through the collaborative work of Drs. Wallace H. Clark, now Professor of Pathology at the University of Pennsylvania; Martin C. Mihm, now MGH Chief of Dermatopathology, and Fitzpatrick.

These criteria are so widely used today many believe they are largely responsible for the more than doubling of the overall 5-year survival rate of melanoma patients—from 40 percent in 1960 to 86 percent in 1987.

One of Dr. Fitzpatrick's current goals is to open a second Pigmented Lesion Clinic at the MGH, one to accommodate patients making follow-up visits, the other to diagnose skin problems in new patients and begin treatment.

"Many people out there are susceptible to melanomas," he said, "and we have to reach them."

In 1969, a lead article in the *New England Journal of Medicine* reported on major work involving Dr. Fitzpatrick and two MGH colleagues, Drs. Madhukar A. Pathak and Edgar Frenk.

They reported discovery of a formula by which PABA (para-aminobenzoic

Lasers May Answer The Needs of Heart And Cancer Patients

(Continued from Page 5)

vascular problems with lasers. They may be used one day to clear blocked arteries *and perform such surgical procedures in the heart as remodel the inside of vessels.*

By combining chemicals and light, a Wellman team is also working to develop novel approaches for treating *internal* cancer. The group has been studying for several years how certain chemicals selectively concentrate in cancer tissue and can serve as a target for light to destroy the cancerous cells without affecting adjacent normal cells.

"We have now amassed enough fundamental knowledge to form teams to pick specific cancers and hopefully over the next several years advance the treatment to patient care," said Dr. John A. Parrish, founder and Director of the Wellman labs and since July 1 head of the MGH Dermatology Department.

Dr. Parrish, who has authored more than 300 scientific papers and eight books, succeeded Dr. Thomas B. Fitzpatrick, who retired as Chief of the MGH service and as Chairman of the Department of Dermatology at Harvard Medical School.

Dr. Fitzpatrick held the two positions for 28 years. Internationally known in his field, he continues to treat patients and conduct research at the MGH, as well as teach here and at Harvard.

Following his twin appointments, Dr. Parrish promoted two MGH personnel: Dr. Arthur J. Sober, Director of Inpatient Dermatology, to be Associate Chief of Dermatology at the MGH and Dr. Howard P. Baden to serve as Associate Chairman of the Dermatology Department at Harvard.

Dr. John A. Parrish, new Chief of the MGH Dermatology Department and Chairman of the Department of Dermatology at Harvard Medical School

Although Dr. Parrish sets policy and has ultimate responsibility for the MGH and Harvard programs, his assignment of special roles to Drs. Sober and Baden enables him to continue his focus on research and teaching.

In addition to directing Harvard's Dermatology Department, Dr. Parrish is Professor of Dermatology there, and he is also a Professor in the Division of Health Sciences and Technology at Massachusetts Institute of Technology. Much of the MGH laser work is conducted in collaboration with MIT and with the Massachusetts Eye and Ear Infirmary.

A graduate of Duke University and Yale Medical School, Dr. Parrish originally wanted to become an internist. But after a residency in internal medicine at the University of Michigan, he entered the Navy at age 28 and went to Vietnam.

He performed distinguished service there for a year as a combat surgeon with the Third Marine Division, earning Vietnam's Cross of Gallantry with Gold. He later described his experiences in a critically acclaimed and New York Times bestseller list book entitled *12, 20, and 5: A Doctor's Year in Vietnam.* (The numerals referred to the practice of helicopter pilots to radio ahead the numbers of litter wounded, ambulatory wounded, and dead being brought to a field hospital.)

The book was rereleased this year by Bantam as a paperback. More than 25,000 copies have already been sold.

Dr. Parrish's second year of military duty found him assigned to a naval hospital in California. It was there that he got a taste of dermatology, and he liked it.

"I just found skin fascinating," he said. "I saw patients with a wide variety of skin disorders, and I seemed to make a difference in their health in a short time."

After discharge from the Navy, Dr. Parrish began a residency in dermatology at the MGH. "I was a 100 percent clinician when I came here, taking care of

(Concluded on Page 8)

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acid), a drug known since 1922, could provide highly effective protection of the skin against solar rays (*MGH News*, May 1984).

The MGH work came at the request of the United States Army. Its troops in tropical areas often risked crippling sunburn during outdoor duty, and no sunscreens then on the market offered much benefit.

The MGH team found after much study that 5 percent PABA in 55–70 percent ethyl alcohol would provide much longer resistance against the sun.

Dermatology at the MGH took another stride forward in late 1974 with the report in the *New England Journal of Medicine* of PUVA (psoralen and ultraviolet-A light) to treat severe psoriasis. Dr. Fitzpatrick, a codeveloper, termed the treatment photochemotherapy, meaning light and drug treatment (*MGH News*, June–August 1978). Photochemotherapy thus became a new branch of medicine.

Of an estimated 55,000 patient visits made annually to the MGH's Dermatology Ambulatory Care Unit, directed by Dr. Ernesto Gonzalez, about 12,500 are for PUVA treatments.

Dr. Fitzpatrick sees a continued bright future for dermatology at this hospital.

"There are still many skin disorders, such as eczema, that have not yet been solved," he said, "but we are getting extremely bright students as well as many contributions of new knowledge from such other specialties as molecular biology and immunology.

"I think that within a few years a substance will be introduced that will control eczema much like insulin controls diabetes.

"That alone would be a tremendous advance."■

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New Psoriasis Care Led to Laser Studies

(Concluded from Page 7)

patients all day every day," he said.

Gradually, he shifted toward clinical research. His mentor, Dr. Fitzpatrick, had developed an interest in applying the effects of ultraviolet radiation to treat skin diseases.

"I guess my first change in direction was based on curiosity," Dr. Parrish said. "I spent much time reading and doing experiments to understand how light and tissue interacted."

The stimulus to establish the Wellman Laboratories of Photomedicine came later from Dr. Parrish's work with Drs. Fitzpatrick, Lewis Tanenbaum, and Madhukar A. Pathak in developing PUVA (a combination of the ancient drug psoralen and ultraviolet, type A, light) for the treatment of psoriasis which affects up to eight million Americans.

The Wellman labs were created in 1975, a year after the reporting of PUVA in the *New England Journal of Medicine.* A gift to the MGH from Gullan Wellman, a patient of Drs. Fitzpatrick and Parrish, and her husband, the late Arthur O. Wellman, made the facility possible.

The laboratories today represent the world's largest multidisciplinary research group systematically studying the basic nature of laser effects on tissue.

Several years of research initiated by Dr. R. Rox Anderson in the Wellman labs led to a treatment using a tunable dye laser for certain skin problems that can have profound psychological effects (*MGH News,* May 1986).

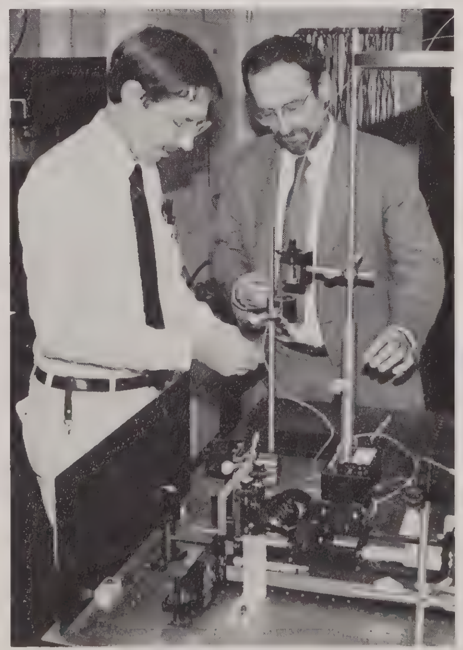
Chief among these conditions were purplish birthmarks known as port-wine stains (hemangiomas). Once responsive only to a surgeon's scalpel, and always with some resultant scarring, the birthmarks now can be eradicated by laser without any scarring or need for a pain-killing agent.

Dr. Parrish attributed growth of the Wellman labs to the recruiting of specialists "whenever we reached stuck points in our understanding" of how to attain certain goals.

"If we were stuck on some photochemistry problem, for instance, we would recruit a photochemist to work with us," he said. "In this way, our staff grew to also include biochemists, physicists, engineers, immunologists, pathologists, cell biologists, and a variety of clinicians."

Dr. Parrish said his basic motivation is to take care of patients, but he realized early on that if he concentrated on helping to develop new treatments, he would have a personal impact on more people.

The Wellman labs already work closely with a variety of medical specialties. Although the use of light, alone or in combination with drugs, to diagnose and treat disease originated in dermatology, the concept called photomedicine actually cuts across many disciplines.



Drs. Parrish, right, and R. Rox Anderson work on a tunable dye laser in the Wellman Laboratories of Photomedicine.

"Much of our work involves organ systems other than the skin," Dr. Parrish said. "When we feel we have new information to make a difference in some disease process, we form an applications team to take that information and begin developing a treatment.

"We recruit a specialist in the particular field, provide an adequate support structure, and that individual becomes the driving force behind the team's efforts."

Dr. Parrish said his laboratories collaborate with cardiologists, urologists, neurologists, and others. "The most applied end of our work," he said, "is with surgeons because of the ability of lasers to cut, seal, or remove tissue."

Dr. Parrish puts in a long workday. Still, he sets aside time for other activities, such as writing poetry. His work has been published in Harper's Bazaar and the Atlantic Monthly. He also enjoys running and wind surfing with his wife, Joan, an Episcopal divinity school student; and their three children, aged 16 to 23.

The MGH dermatologist tells about once having a fantasy about running in a marathon. "When I set my mind on something, I do it," he said. He devoted time every day for 12 weeks to train and then ran in the Newport, R.I., marathon. "I finished in about three and a half hours," he said, "but I'll never do it again."

On another occasion, Dr. Parrish joined several other people—a writer, reporter, lawyer, and poet—in trying out for the Pittsburgh Pirates at their spring training camp. Predictably, all were cut from the professional baseball team after about a week, but each wrote a chapter for a book, *Playing Around,* published by Little Brown.

The chapter contributed by Dr. Parrish was entitled, "Lemons in the Sun."■

MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 1 January–February 1988

Carbon Monoxide Gas: A Silent Peril in Daily Life

In areas of the nation where winter spreads a mantle of snow and ice, the potential for bodily harm increases.

People walk cautiously to avoid falls, bundle up to ward off cold, and seal their homes against drafts.

But few consider that at times it can also be perilous just to breathe.

Although government agencies have made substantial progress in reducing air pollution during the past 15 years, millions of people live in regions where carbon monoxide (CO) still exceeds national standards established to protect public health.

CO is a colorless, odorless, highly poisonous gas produced by the incomplete burning of fossil fuels, such as oil, gasoline, natural gas, coal, or wood.

"Carbon monoxide is the leading cause of death in this country from poisoning," said Dr. J. Dugan Mahoney, attending physician in the MGH's Emergency Ward. "It accounts for more fatalities each year than all drug overdoses combined."

He described winter as the time for greatest caution. For one thing, adverse weather can cause long lines of snarled traffic. Despite emission controls on motor vehicles and inspection programs to ensure that cars and trucks are properly maintained, motor vehicles account for almost two thirds of the CO pollution in the United States.

Dr. Mahoney advised motorists to heed warnings of traffic tie-ups and either seek an alternate route to reach a destination or time a trip for a nonpeak hour. Delays in tunnels pose a particular problem. Motorists in these circumstances are advised to use recirculating air in their vehicles instead of outside air.

Avoiding traffic snarls is especially important, Dr. Mahoney said, for people

(Continued on Page 4)

AIR QUALITY
MOBILE LABO

A team from the Environmental Protection Agency checks an area for suspected high concentrations of carbon monoxide.

An Easy Way to Treat a Difficult Disease

Treating a disease before it is diagnosed may seem like putting the cart before the horse, but sometimes an unusual disorder calls for unusual measures.

Such is the case with polymyalgia rheumatica, a malady which might be called more simply "aches, pains, and stiffness among the aging."

Although physicians have known of polymyalgia rheumatica, or PMR, for a century, the relatively common disease affecting people past 50 (women twice as often as men) has always been poorly understood. One of its major characteristics, for instance, is inflammation, but no one can tell where it is in the body.

No one has yet developed a test that will positively diagnose PMR. Laboratory studies of tissue biopsied from joints, muscles, and nerves have failed to offer a clue.

Experience has shown, however, that when PMR patients are treated with low doses of prednisone, a synthetic cortisone, virtually all report immediate relief.

The response is so dramatic that the treatment, in effect, has also become the diagnosis.

Striking across the shoulders and chest, up the sides of the neck, around the hips, and down the upper thighs, the symptoms of PMR differ from usual aches and pains that older people experience in that the polymyalgia is not brought on by overuse of joints.

Most patients with PMR report a sudden onset of pain during the night that leaves them feeling the next morning as though a train had hit them.

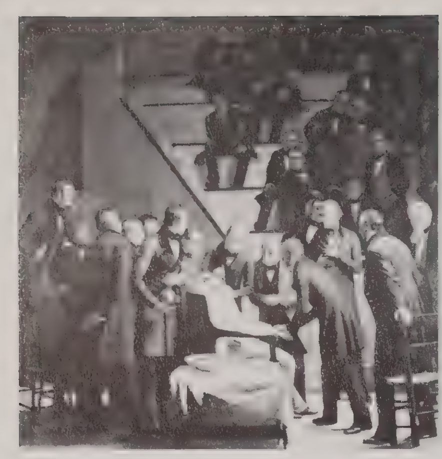
They feel better as the day progresses but dread going to bed the next night because the discomfort soon redevelops. Some patients describe the distress as like that of flu without fever.

Often when such a patient outlines the symptoms to a physician, the doctor considers the patient's age, figures that most older folks get aches and pains anyway, and dismisses the problem as not very serious.

"What usually gets a physician to think about PMR is the result obtained from an erythrocyte sedimentation rate [ESR] test," said Dr. John A. Mills, Director of the Arthritis Clinic at the MGH.

ESR refers to the settling of red cells in blood placed in a tall glass tube. Normally, the cells, which are heavier than

(Continued on Page 2)



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EDITORIAL:

The Exploding Universe of Radiology

If medicine is an exploding universe of technology, then radiology is its nexus. It is difficult to imagine practicing any specialty or primary care without radiology. Even psychiatry in its most traditional, non-physical mold sometimes employs radiological tools. With each new technological breakthrough, radiology seems to reach its limit. Momentarily. Investigators keep finding new wrinkles and new applications for each advance. And then they find new advances based on different principles. X rays. Radioactive materials. Soundwaves. Magnets. Each advance shoves back the previous frontier.

We have not even mentioned interventional radiology: the radiologist as therapist rather than diagnostician. Like cardiologists, interventional radiologists are now taking on problems once resolved only by surgeons. The new radiologist may enlarge the wall of a clogged leg artery. Or neutralize the life-threatening pouch of a weakened brain artery.

It has been Dr. Juan M. Taveras' good fortune to guide the MGH's Department of Radiology through its most exciting time. It has been the Department's good fortune to have Dr. Taveras guide it through its most exciting time. To achieve this transformation with so little friction has been an extraordinary feat. To begin with, the new diagnostic technology has demanded fiscal flexibility. These diagnostic tools usually arrive with million dollar price tags even with discounts that sometimes come for pioneering assistance. Many of these diagnostic weapons also consume huge bites of space—space that is precious in a landlocked urban hospital. As for interventional techniques, they can incite anxious moments for other specialties that have dominated the traditional treatments.

It is not through some mystical alignment of the planets that the MGH has been in the forefront of development or acquisition of these new technologies. To determine which new technology deserves the fiscal and spatial resources takes vision on the part of the department head as well as the hospital's administrative leaders. To the credit of the MGH, chiefs of several departments have joined hands in cooperative ventures to help radiology secure some of the technologies.

Now Dr. Taveras is retiring, and Dr. James H. Thrall will replace him. Based on his own record, Dr. Thrall will bring with him the expertise, organizational skills, and leadership qualities to maintain the position that Dr. Taveras has given MGH radiology.

Aging Pains

(Continued from Page 1)

the fluid, will settle at a rate of about 20 millimeters in an hour. When PMR is present, the sedimentation rate is frequently 120 to 150 millimeters in an hour.

"An elevated ESR indicates presence of an inflammation," Dr. Mills said. "In polymyalgia rheumatica, the rate is very high in almost all cases, often higher, in fact, than the ESR reading one obtains for many other diseases involving inflammation."

Since the aches, pains, and stiffness of simple aging do not increase the sedimentation rate, a high ESR alerts the physician that something abnormal is going on.

But what does the patient have? Polymyalgia rheumatica? Some form of arthritis or other connective tissue disease? Perhaps an infection? The list of possibilities runs long.

"If PMR were present and the patient took a small bedtime dose of prednisone, the individual would probably enjoy a wonderful sleep and awaken the next morning thinking that the illness was gone," Dr. Mills said.

After such a response, the patient would be asked to continue taking a low dose of the medication, perhaps 10 or 12 milligrams daily, for 10 days. Then another ESR measurement would be made. If PMR, the rate would now be down almost to normal.

"That would pretty well clinch the diagnosis," Dr. Mills said.

He stressed the importance of the dramatic overnight response as a clue.

"Any kind of joint disease would be likely to respond to the prednisone if it had been given for three, four, or five days running," he said.

Dr. Mills cautioned that rheumatoid arthritis should not be treated in its early stages with prednisone since that affliction would not be likely to respond thereafter to small doses. Large doses would be necessary, and that would bring on adverse side effects.

Normally in using the corticosteroid drug, physicians begin lowering the

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Photographs: Pages 1, 4 (upper), 5, courtesy o U.S. Environmental Protection Agency; pp. 3 (upper), 7, 8, Myron Daniels; p. 3 (lower), courtesy of MGH Social Service Department: p. 4 (lower), Fred Comegys, courtesy o National Fire Protection Association; p. 6, courtesy of Dr. James H. Thrall

In the MGH Hematology Laboratory, Technician Wendy Gershlak determines the results of a patient's ESR (erythrocyte sedimentation rate) blood test which can indicate presence of an inflammation in the body.

Although no one has developed a test that will positively diagnose polymyalgia rheumatica, low doses of prednisone bring immediate relief to such patients.

dosage as soon as the ESR comes down. The sedimentation rate is also checked every few weeks. Dr. Mills said that within six months or a year it is often possible to stop prescribing the drug altogether.

"In the meantime, you have kept the patient at absolutely the smallest effective dose," he said. "In that way, the patient doesn't have to cope with any side effects. Most can be controlled on seven-and-a-half or 10 milligrams a day."

Diminishing the dosage as soon as possible is particularly important for elderly women, who comprise the largest group of PMR patients. They commonly develop thinning of bone (osteopenia) which can be aggravated by prolonged corticosteroid treatment, even at conservative doses.

Sometimes as use of the drug winds down, a patient may endure a little aching. For these individuals, another anti-inflammatory agent, such as aspirin, can be given in conjunction with a low amount of prednisone so long as the ESR rate stays normal.

Between 25 and 50 percent of patients with polymyalgia rheumatica may also have a condition known as giant cell arteritis (GCA), the most common form of a disease which inflames arteries (*MGH News,* May 1984).

Dr. Mills said that GCA can usually be controlled by the same dosage of prednisone that is given for PMR. But, he added, if signs of GCA include headaches, pain in the jaw, or scalp tenderness, physicians may well prefer to start treatment with somewhat higher doses of the corticosteroid. The reason is that the symptoms could indicate involvement of arteries to the eyes, threatening blindness.

One often finds that within a few weeks one can reduce the dose of prednisone to the same amount that would be used to treat PMR alone. By checking the sedimentation rate anew, one can judge whether the patient is getting enough of the drug.

What would happen if a patient failed to be diagnosed as having PMR and went without any treatment? Dr. Mills said that taking a medication other than prednisone probably would not be harmful, but it would also not be very helpful.

"Chances are," he said, "that in most instances the disease would just burn itself out after a year or two. But the patients may have a miserable time.

"Perhaps 10 percent will have a very protracted illness. It could continue for as long as 10 years. And a certain percentage, even after treatment, could have a relapse."

Efforts continue, meantime, to learn more about the disorder. Investigators have been studying a possible link between PMR and chemical mediators in the body called lymphokines. One of these, called Interleukin-1, is found to be elevated in people with inflammatory diseases. Dr. Mills, who is also Associate Professor of Medicine at Harvard Medical School, said:

"It turns out that if you infuse Interleukin-1, you can produce most of the clinical manifestations of PMR.

"It's quite possible that some sort of infection is causing the marked elevations of Interleukin-1 levels in the body and that this infection is responsible for both the symptoms of the PMR and the abnormally high ESR findings obtained in the laboratory."■

Often robbed of sleep by nighttime attacks of aches, pains, and stiffness, patients with untreated polymyalgia rheumatica dread the prospects of more discomfort the next night.

Motor vehicles account for two thirds of the carbon monoxide pollution in this country.

Carbon Monoxide Blocks Oxygen in Blood

(Continued from Page 1)

whose lungs are not functioning at 100 percent because of cardiorespiratory disease.

In homes where windows have been sealed against severe winds and chill, faulty heating systems can invite disaster.

"Any faulty combustion, whether from a furnace, a space heater, or a kitchen stove, will lead to an accumulation of carbon monoxide unless there is proper ventilation," Dr. Mahoney said.

Exposure to the gas at industrial work sites, such as petroleum refineries, steel plants, and pulp mills, is another major cause of concern.

When inhaled, CO binds to hemoglobin, the oxygen-carrying protein in red blood cells, and lessens the amount of oxygen that can reach the brain, heart, and other parts of the body.

When the bound hemoglobin, called carboxyhemoglobin, reaches a level of about 20 percent, mild symptoms such as a headache develop. Numbness and dizziness would be expected at levels of 30 to 40 percent. Between 40 and 50 percent, unconsciousness might ensue.

Researchers have reported that cigarette smoking alone can elevate carboxyhemoglobin. The federal Environmental Protection Agency (EPA) has reported that some limited animal trial data suggest elevated CO exposures may endanger a fetus.

"Although this has not yet been demonstrated in humans," the agency said, "evidence from studies of smoking mothers, a major source of carbon monoxide exposure to the fetus, has shown a variety of fetal and newborn effects."

The EPA also said that studies of individuals susceptible to chest pain due to insufficient blood reaching the heart (angina) indicate that CO can accelerate onset of the angina during exercise.

In November, the agency proposed extending a year-end 1987 deadline for communities to lower CO emissions to permissible levels or face stern economic sanctions under the Clean Air Act. The proposal also applied to a mandated reduction in levels of ozone, a major component of smog.

The December 31st deadline was in itself an extension of two previous ones set in 1977 and 1982. Seven Northeastern states criticized the latest EPA plan, claiming they would suffer from continuation of some of the worse pollution sources in other states.

Sixty-five cities and rural counties around the nation have been listed as failing to meet CO standards. Boston is among the cities.

In emphasizing the hazards of carbon monoxide and a need for effective antipollution measures, Dr. Mahoney cautioned that most people who suffer headache, nausea, or vomiting from CO are victims of low levels of toxicity.

"Once they leave the enclosed environment, the symptoms often quickly disappear," he said, "but if the individual returns to the same environment without action being taken to eliminate the gas, the toxicity becomes prolonged. This can lead to permanent neurological damage."

The damage can range from fairly subtle changes in personality, memory, or cognitive ability to loss of motor function, blindness, and even death.

Dr. Mahoney said carbon monoxide not only binds to hemoglobin but also to so-called mitochondrial enzymes very similar in makeup to hemoglobin which help provide energy in cells throughout the body.

When a person suspected of CO exposure arrives at a hospital ER (emergency room), he said, a test is given to detect the amount of gas bound to the hemoglobin, but no test is available to indicate how the mitochondrial enzymes may have been affected.

"The major effects of long-term exposure to carbon monoxide probably stem from its binding to these enzymes," he declared.

This firefighter risked his life since as much as 10 percent of smoke in a major fire can be deadly carbon monoxide.

Expanded Training Urged in Radiology

"Radiology is developing faster today than medicine in general," said Dr. James H. Thrall.

"In terms of the number of diagnostic studies being requested, radiology is growing faster than patient visits and surgical procedures."

But Dr. Thrall, who arrives at the MGH on February 1 to head its Radiology Department, quickly added that in one important respect his specialty is lagging.

"In the training of radiologists," he told the *MGH News,* "basic science fundamentals have not been updated to reflect the progress that has been made in the field.

"The basic science courses taught in radiology today are fundamentally the same as they were 20 years ago when I was in training and focus almost exclusively on the physics of generating X rays.

"We have not developed a basic science curriculum to teach radiologists about computers or about metabolic and function studies. For that reason, in part, many advances made in imaging have actually come from people outside departments of radiology."

Dr. Thrall sees imaging playing an increasingly important role in the evolution of new technologies. He called for a curriculum that will ensure a generation of radiologists to take part in these future developments.

Since 1983, Dr. Thrall has been Chairman of the Department of Radiology at Henry Ford Hospital in Detroit and Clinical Professor of Radiology at the University of Michigan Medical Center in Ann Arbor.

He will succeed Dr. Juan M. Taveras who is retiring after 16 years as MGH's Chief of Radiology and as Professor and Chairman of Harvard Medical School's Department of Radiology at MGH.

Dr. Thrall listed what he considers to be the four fastest moving frontiers in radiology: magnetic resonance imaging (MRI); nuclear medicine with a focus on positron emission tomography (PET) and radio-labeled antibodies; interventional radiology with a focus on vascular procedures for the treatment of arteriosclerosis and tumors; and computers which, he said, will become critical to every subspecialty.

In planning to help these four areas advance, Dr. Thrall emphasized that they are not the only subspecialties in radiology that are extremely important.

"In breast cancer, for example, mammography is highly specific as a screening technique," he said. "The MGH has been recognized for its leadership in this field, and I don't intend to diminish that. But mammography is not in a technical development mode at the moment."

Dr. Thrall pointed out that historically procedures have been available to radiologists allowing them to analyze gross anatomy and to correlate that with gross pathology.

"But now," he said, "we have ways to actually watch organ systems function." Radiologists can administer a radioactive form of sugar (glucose) to a patient and with PET "watch the brain think."

Having a primary role in cerebral function, glucose goes to areas of such activity. "A doctor who exposes a patient to a stimulus," Dr. Thrall said, "can actually watch parts of the brain 'light up' as it processes that stimulus. This is tremendously different from the traditional problems of diagnosing a fractured leg or identifying pneumonia."

(Concluded on Page 6)

Customary ER treatment for exposure to CO involves administering 100 percent oxygen to the patient via a face mask for a couple of hours and then rechecking the CO status in the blood. Following signs of improvement, the patient can usually be sent home. If the gas emissions occurred there, the patient is admonished to have the proper authorities both test for CO accumulation in the home and check for a possibly defective heating unit.

When a person has a CO hemoglobin level as high as 40 percent or signs of neurological damage from CO exposure, many physicians recommend the use of a high-pressure (hyperbaric) chamber.

With this device which can subject the individual to an atmosphere two or three times greater than that of room air, a delivery of more oxygen is possible to try to drive the CO from the body.

Dr. Mahoney, who is also Instructor in Medicine at Harvard Medical School, said the appropriate indications for using a hyperbaric chamber are controversial, but he said:

"Carbon monoxide toxicity is due to two factors, the amount of time the CO is in the body and the extent of involvement. If one can reduce the time and the scope, then the toxicity is minimized.

"There have been instances when a person comatose for several days from carbon monoxide was put into a hyperbaric chamber and later recovered with minimal physical or mental disability."

Acrid, black clouds billow from a pair of industrial smokestacks.

Hyperbaric chambers are not always close by, however. In Boston, patients in need of such assistance are usually transferred to a medical center at Portsmouth, N.H.

Physicians such as Dr. Mahoney, who specialize in emergency medicine, are particularly concerned that many patients affected by CO are misdiagnosed and dismissed as having the flu or a tension headache.

"Doctors are not always fully aware of the circumstances that preceded their patient's visit," he said. "In addition, enough time may have elapsed between the patient's CO exposure and arrival at the hospital for levels of the gas in the body to have fallen appreciably."

Dr. Mahoney referred to studies of patient visits to ERs in cities such as Chicago and Louisville. He said the studies indicated that during the winter between 5 and 10 percent of patients who complained of flu-like symptoms or just headaches may actually have been suffering from the consequences of carbon monoxide exposure. ■

Heavy Demand for Radiologic Testing

(Concluded from Page 5)

Dr. Thrall said that under the leadership of Dr. Taveras the MGH Department of Radiology has built a worldwide reputation for excellence and positioned itself well to carry forward the transition to the new era in radiology.

The two radiologists are working hard, however, to fill a departmental need. The hospital's cyclotron, used to make radioactive chemicals with which to label biologically active compounds, dates from 1964. The instrument cannot produce the chemicals required for important new studies, and since the tracer substances must be made on site because of their short life, the radiologists are striving to replace the old cyclotron with a new one.

Another problem is that demand for diagnostic imaging studies is so great at the MGH that sometimes patients must make appointments well in advance. Dr. Thrall plans to tackle this issue.

"I have already spent a lot of time at Henry Ford Hospital trying to determine how best to use limited numbers of such devices," he said. "It is a common problem today in hospital radiology departments. I'm confident there are strategies one can follow to ease the problem of utilization."

Another issue involves the kind of technology that is best suited for a particular diagnostic effort. Whether computed tomography does a better job than MRI, or MRI is better for a certain purpose than PET, is not always settled to everyone's satisfaction.

"The decision usually comes ultimately from the experience of many institutions," Dr. Thrall said. "But in any one institution, there can be legitimate and healthy debate. Radiologists must think in these terms and help referring physicians to understand better which studies are most appropriate in a particular situation. Not every radiology department has embraced this responsibility."

At Henry Ford, Dr. Thrall directed some 72 MDs and a total staff of about 400. His operation was basically oriented toward patient care. At the MGH, he will head a staff that is not only larger but one also extensively involved in both patient care and research.

Dr. Thrall is participating at present with several MGH radiologists and pulmonary specialists in a six-institution, government-sponsored study to assess the accuracy of lung imaging in the diagnosis of pulmonary blood clots (emboli).

Dr. Thrall has long been interested in how nuclear medicine can advance studies of organ systems. He has worked on new techniques for skeletal imaging as well as for scanning of the thyroid and adrenal glands.

During the mid 1970s, he devoted a number of years to directing the nuclear cardiac program at the University of Michigan. Subsequently, he helped to develop a technique called diuresis renography which involves the urinary tract and a procedure called hepatic artery perfusion scanning to evaluate chemotherapy in patients with tumors of the liver.

Dr. Thrall realized early that he would follow a career in science. His father, Dr. Robert M. Thrall, now retired, served as a Professor of Mathematics at the University of Michigan for 32 years and later at Rice University for 16 years.

"When I was growing up," Dr. Thrall said, "my father would always pose math problems for my brother, sister, and me at the dinner table or while riding in the family car. We were challenged with concepts in math very early in life."

Dr. Thrall majored in mathematics at the University of Michigan. He graduated with High Distinction in 1964 and was elected to Phi Beta Kappa.

He already knew that he wanted to attend medical school. As the result of a desire to study overseas, he had taken a year out of his regular schooling to attend Eberhard Karls University in Tübingen, Germany. While there, he lived with a family that was deeply rooted in medicine. The father was director of the Max Planck Institute for Virus Research. The mother was a pediatrician. And a daughter was a medical school student.

Later at the University of Michigan Medical School, Dr. Thrall decided to specialize in radiology because more than any other area it was a natural blend with his background in mathematics.

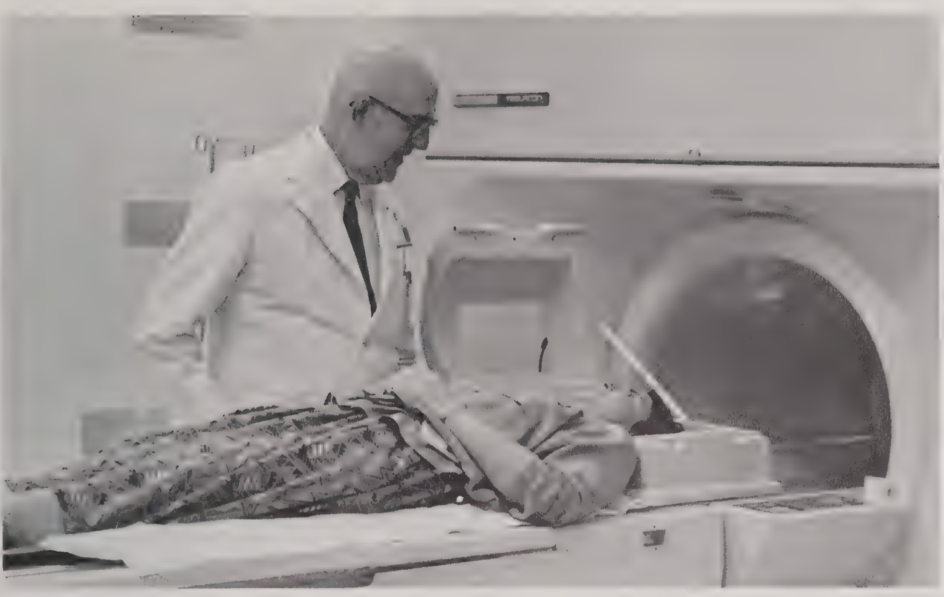
He took his residency in radiology at the Walter Reed Army Medical Center in Washington and later served as Assistant Chief of its Nuclear Medicine Service.

After joining Henry Ford Hospital in 1983 to become head of radiology, he rose to Vice Chairman of the hospital's Board of Governors and to membership on the Board of Trustees.

Active in numerous professional societies, Dr. Thrall has authored or co-authored 123 scientific papers, four books, and 46 book chapters. He serves on the editorial boards of the *European Journal of Nuclear Medicine* and the *International Journal of Cardiac Imaging* and has served on the board of the *Journal of Nuclear Medicine*.

Dr. Thrall and his wife, Jean, have a 16-year-old daughter, Keely, who attends high school, and a 19-year-old son, Trevor, a junior at the University of Michigan. The family enjoys skiing in the winter and golf and tennis in the summer. ■

Dr. James H. Thrall, named to be the MGH's Chief of Radiology and Professor and Chairman of Harvard Medical School's Department of Radiology at the MGH



Dr. Taveras demonstrates with a volunteer how a patient prepares to undergo a magnetic resonance imaging test.

Radiology at MGH Enjoys World Esteem

When Dr. Juan M. Taveras came to the MGH in 1971 as its fifth radiologist-in-chief, he faced a formidable challenge.

With radiology fast increasing in complexity, much of the department's radiographic equipment was nearing the end of its useful life.

But Dr. Taveras arrived well prepared. Having already directed two other prestigious departments of radiology, he devised and implemented an aggressive, carefully phased equipment replacement program, paved the way for creation of nearly a dozen subspecialty sections within the department, and made room for an entirely new and revolutionary diagnostic imaging technology.

The vigor, enthusiasm, and wisdom that Dr. Taveras exhibited in the early 70s continued throughout his 16-year tenure as Chief which concludes early this year. In turning the reins over to his successor, Dr. James H. Thrall, Chief of Radiology at Henry Ford Hospital in Detroit (see accompanying story), Dr. Taveras transfers control of a department that has become the largest and one of the most respected of its kind in the world.

The department's roster of some 440 includes 140 MDs and more than two dozen Ph.D.s. Its training programs graduate eight Residents and 24 Clinical or Research Fellows each year.

The outgoing Chief also relinquishes his chairmanship of the Harvard Medical School's Department of Radiology at the MGH but retains his role of Professor. At 68, he will continue to serve as a consultant and teacher, and he also plans to expand on his writing contributions to radiology which in the past have won him many honors.

When the noninvasive imaging procedure called computed tomography (CT) became available at the MGH in August 1973, the hospital was only the second medical center in North America to own a scanner that could X-ray soft tissue of the brain.

Dr. Taveras helped to build the MGH Radiology Department into the largest and one of the most respected in the world.

Spectacular successes of CT led in 1976 to the MGH's installation of a total body CT scanner and in succeeding years to acquisition of such other computerized imaging machines as digital ultrasound, nuclear magnetic resonance, which includes magnetic resonance imaging (MRI) and spectroscopy; and positron emission tomography (PET).

(The MGH actually pioneered positron imaging studies as long ago as 1952 and over the years contributed numerous improvements in concepts and design to positron instrumentation. The MGH also was involved in developing MRI.)

As more new devices were introduced, Dr. Taveras saw the need grow for subspecialists within radiology. He also felt strongly that their area of expertise should be tied to individual organ systems of the body rather than a technique.

"The organ-oriented radiologist not only has special interpretive skills," he said, "but can also safely perform all invasive diagnostic and interventional procedures in his subspecialty.

"He works closely with the clinical specialists who are involved with the same organ system, creating the team approach that leads to improved patient care. This is not achieved by radiologists who are technique-oriented subspecialists."

Dr. Taveras emphasized that the importance of the subspecialist does not eliminate radiology's need for generalists.

"General radiologists are essential in an ambulatory care setting or an emergency room, just as are general internal medicine specialists," he said. "One never knows the kind of illness or injury that will be encountered next. The general radiologist can respond ably to wide-ranging needs and then, if necessary, call for the subspecialist."

When Dr. Taveras arrived at the MGH Radiology Department, a section in neuroradiology had already been established. As time passed, he added 10 more sections, including nuclear medicine, angiography, cardiac, gastrointestinal, genitourinary, bone, chest, breast, pediatrics, and more recently magnetic resonance.

Dr. Taveras became convinced early in his career that subspecialization was the way for radiology to go. After graduating from the University of Santo Domingo Medical School in his native Dominican Republic, he earned a second MD degree at the University of Pennsylvania and trained there in general radiology. This led to a position at Columbia Presbyterian Medical Center where as a junior staff appointee he was able to work in four different areas of his chosen field.

Only two years later, Dr. Taveras became head of radiology at Columbia's Neurological Institute. During a 13-year tenure, he profoundly affected the course of neuroradiology throughout the world.

When the National Institutes of Health began to support training in the neurosciences, Dr. Taveras was a natural selection to serve as program director for the first NIH fellowships in neuroradiology.

Before coming to the MGH, Dr. Taveras also served six years as Director of the Mallinckrodt Institute of Radiology, affiliated with Barnes Hospital and Washington University School of Medicine in St. Louis. Programs he initiated in

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An Even Brighter Future Seen for Radiology

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the Barnes complex significantly strengthened the practice of radiology there.

Dr. Taveras founded the American Society of Neuroradiology, now numbering about 1100 members, and also established and became editor of the *American Journal of Neuroradiology.*

In addition to being an author of some 210 scientific papers, he has authored or coauthored seven books, including a classic text, *Diagnostic Neuroradiology,* written with the late Dr. Ernest Wood of Columbia, and a new five-volume series, *Radiology,* coauthored by Dr. Joseph T. Ferrucci, Jr., of the MGH.

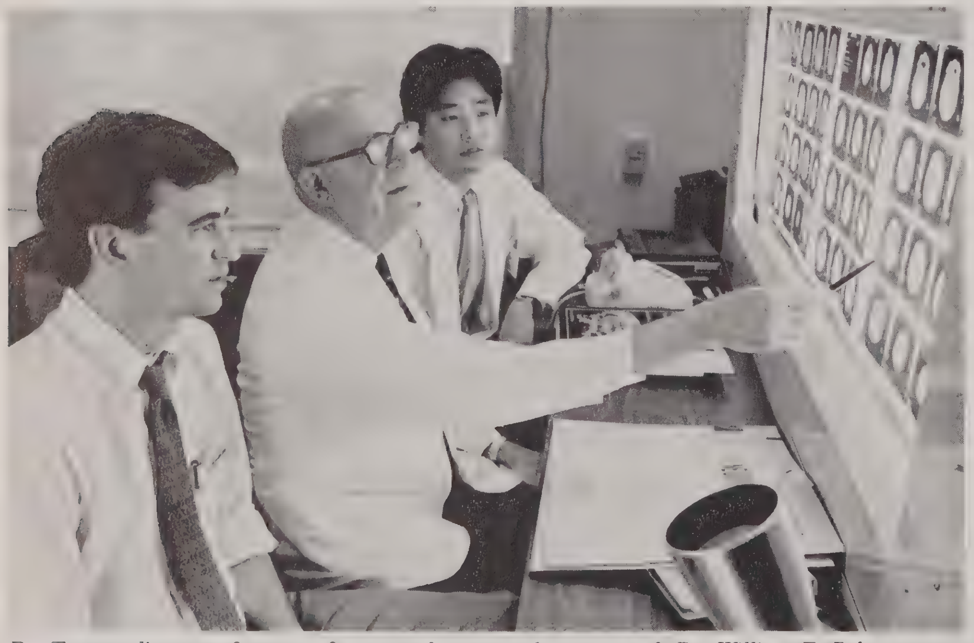
Further attesting to Dr. Taveras' outstanding position in his field is his receipt of a record number of prestigious medals, including gold medals from the Radiological Society of North America, the Association of University Radiologists, and the American College of Radiology, as well as the Caldwell Medal of the American Roentgen Ray Society.

He was also chosen recently by the American College of Radiology to appear in the videotape series entitled, "Living Legends in Radiology."

Looking to the future, Dr. Taveras regards computer-controlled imaging and interventional radiology to be the two most rapidly growing areas in radiology.

Imaging techniques, he said, have been greatly enhanced by conversion to digitizing (numerical) processes, and potentials exist for further improvements there. He also predicted a new technique to rival nuclear magnetic resonance. Called electron spin resonance, it uses electron instead of nuclear spins.

"The resolution of the images can improve with the new method," he said. "There probably will be some difficulties due to physical limitations, but I think there are great potentials for it in the future as an add-on to what we have now."



Dr. Taveras discusses features of computed tomography scans with Dr. William E. Palmer, Resident in Radiology, left, and Dr. Satoru Tominaga, Research Fellow in Radiology.

As for interventional radiology, which enables radiologists to not only diagnose a disorder but to initiate therapeutic measures as well, Dr. Taveras said, "I can see this growing more and more as time goes on. It is amazing to see what is being accomplished in various parts of the world."

He told of a recent visit to Kiev in the Soviet Union by an MGH neuroradiologist, Dr. John M. Pile-Spellman, who witnessed a procedure that would have been unbelievable a few years ago.

When a patient develops an aneurysm, or outpouching, on an artery of the brain, the conventional treatment has been to guard against a hemorrhage by clamping a metal clip on the neck of the sac. In Kiev, Dr. Pile-Spellman saw a neurosurgeon-neuroradiologist extend a tube (catheter) through a patient's brain artery and install a balloon into an aneurysm. The patient was walking about the very next day, protected from a possible rupture by the balloon.

Medicine takes up much of Dr. Taveras' life. His career influenced one of his three children to enter the medical profession. Jeffrey, now 30, is a Resident in Ophthalmology at the New York Hospital–Cornell Medical Center. But the MGH specialist has another love—music.

He is a trustee of the Boston Opera Company, and his wife, Berenice, is a member of the board of The Civic Symphony of Boston.

"In fact, it was by playing in orchestras and jazz bands," he said, "that I was able to finance my way through my medical schooling."

Dr. Taveras plays clarinet, saxophone, and flute . . . also "a little guitar and piano."■

MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 2 March 1988

Ethicist Helps to Resolve Dilemmas in Patient Care

. . . A gasoline explosion burns a 70-year-old man over 85 percent of his body. At the hospital, his grieving wife advises doctors to let him die because "he would not want to live like this." But the patient urges them to do their utmost.

A few weeks later, his attitude changes. He appeals for a halt to life support efforts, but some people caring for him judge that he is now incompetent to make such a decision. Still, the doctors begin to wonder: Should they follow the wishes he expressed in the beginning? Did his wife really convey his true feelings?

. . . A baby is born with an underdeveloped intestinal tract. Transferred from the rural hospital to a major center, she undergoes surgery that fails. "We have a terrible tragedy here," doctors tell the parents. They have two options: Allow the baby to die within a few days by doing no further surgery or have surgeons install a feeding tube on which the daughter probably would be dependent throughout life.

She would never eat normally, and the cost of the special food alone, even at today's prices, would exceed $30,000 a year. In weighing a decision, what values should take precedent, and in the event of conflict, who should have the final word?

. . . A nurse attending AIDS patients learns she is pregnant at just the time a young man is admitted in the final stages of the disease. He is wracked by coughing and has open wounds on his body. Suddenly he gasps for breath and calls for help. The nurse is alone on duty. Aware of her responsibility, she also fears a threat to her pregnancy. What should she do?

* * *

Moral dilemmas are commonplace in medicine. In the past 20 years or so, medical science has become so sophisti-

(Continued on Page 2)

Letting the Body Heal Weakened Lungs

Making sick or injured people well often depends less on treatment than on providing support for the body while it essentially heals itself.

Challenges posed by respiratory failure exemplify the medical profession's dependence on the body's natural healing powers.

Instruments have become available that dramatically improve the ability of caregivers to diagnose and monitor critical insults to the lungs. But the effectiveness of treatments for severe respiratory failure has improved little in the past 20 years.

Some 150,000 persons are stricken annually in this country with Adult Respiratory Distress Syndrome (ARDS), a common result of a series of frequently unrelated assaults on the lungs. The death toll from ARDS is estimated to be greater than 60 percent.

Researchers point to massive injuries from accidents and the presence of disease-causing organisms in the blood or tissues (sepsis) as the leading factors associated with this hard-to-manage syndrome.

In contrast to the difficult uphill battle usually fought against ARDS, physicians often obtain rewarding results from supportive therapy given for many less overwhelming lung conditions referred to as Acute Respiratory Failure.

Suppose a person drank from a soda bottle only to discover that instead of soda to quench his thirst, the bottle contained an insect killer. (Such improper

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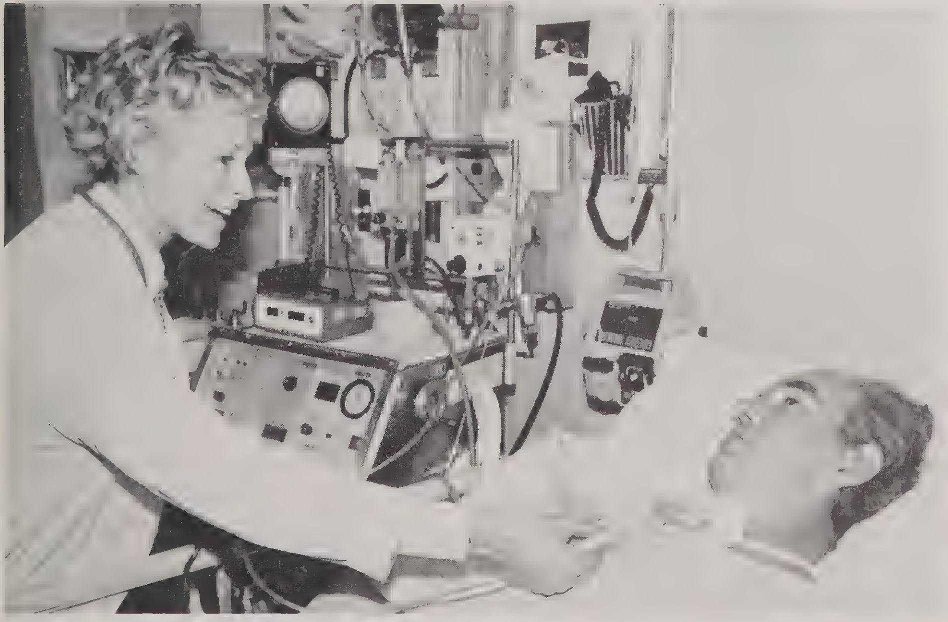

Respiratory Care Consultant Donna Wilson enables paralyzed Francisco Borjas of Cuba to speak by directing air through a special tube into his windpipe and then to his vocal cords.

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EDITORIAL:

Thomas Paul Hackett

Thomas Paul Hackett, Jr., was an iconoclast. In his Catholic high school in Cincinnati he refused to renounce his belief in Darwin's Theory of Evolution. The school expelled him. His early appointments as a physician were hardly traditional: a series of federal prisons including Alcatraz.

At the MGH he joined and later headed the Psychiatric Consultation Service which treats the psychiatric problems of patients admitted for medical problems. That unit employs a variety of techniques including hypnosis. When he became Chief of Psychiatry in 1976, he encouraged staff members to follow their own inclination in treating patients even when their methods diverged from his own; this in an institution that had once adhered to classical Freudian philosophy.

During his 12-year tenure as Chief of Psychiatry, he added to the size and stature of the department. One of the psychiatrists started a psychopharmacology publication that has become the most read by psychiatrists and other mental health practitioners.

Tom Hackett's curiosity was omniverous. And his knowledge matched his interests. He had special affinity for such psychiatric phenomena as hexing, violence and the criminal mind, hypnosis, parapsychology, hostage taking, pain, and the psychological response to heart attacks. Outside of psychiatry his knowledge encompassed subjects like herpetology, botany, biology, physiology, and even tattoos. People often thought of him as a walking encyclopedia.

The public commonly presumes that anyone with a history of having been a child prodigy (he was an Instructor in Physiology at the University of Cincinnati at age 13) is a pedagogue. Not Tom Hackett. At a dinner party he inevitably regaled people as a raconteur. Unlike many people with that gift he enjoyed listening as much as talking. His laugh seemed to start somewhere in his socks and reverberated until it echoed from his lips. You could hear that laugh and the lilt of his voice 40 feet away at a cocktail party.

His energy seemed infinite. He walked rapidly through the corridors of the MGH. A brief sleeper he would wake at 3 a.m. to work in his home study. Illness shunned him. His one concession to mortality came a few years ago when gout forced him to give up running. He turned to horseback riding and developed a passion for it. If his colleagues had ever taken a poll on who was likely to live the longest, Tom Hackett would have been among those considered destined to reach age 90. But he died on January 23 while riding a horse—suddenly, in the saddle. He was 59.

Ethicist

(Continued from Page 1)

cated that even if injury or disease has radically changed a person's life, that individual can still be kept alive.

But how well is the patient served? What are the patient's own wishes? And those of the immediate family? Can the attending physician feel confident that a chosen course of action is ethically correct?

On October 1, Ruth Bryant Purtilo, Ph.D., assumed a dual role at the MGH. She became Ethicist-in-Residence at the hospital and Henry Knox Sherrill Professor of Medical Ethics at the MGH Institute of Health Professions.

Dr. Purtilo consults with the hospital's professional and administrative staffs on ethical issues which confront them. In the Sherrill professorship, her role includes designing and teaching courses in health care ethics.

The professorship honors the memory of a former Presiding Bishop of the Episcopal Church who in the mid 1960s also helped to form an ethical framework for the conduct of human studies at the hospital.

An author or coauthor of eight books as well as 37 articles or book chapters, Dr. Purtilo returned to the MGH from the University of Nebraska Medical Center where she served as Professor and Chairperson of its Department of Medical Jurisprudence and Humanities.

She holds two advanced degrees from Harvard, a Ph.D. in ethics from its Graduate School of Arts and Sciences and a Master's Degree in Theological Studies from its Divinity School. Earlier, she earned a Bachelor of Science Degree in Physical Therapy, summa cum laude, from the University of Minnesota.

Dr. Purtilo initially practiced and taught physical therapy (PT) at a variety of places, including a rehabilitation center in North Dakota; a general hospital in Chicago; in Cartagena, Colombia, for Project Hope; and in Swaziland, South Africa, as a Smith, Kline & French Fellow.

Between 1968 and 1971, she served as a PT instructor at Boston University.

Photographs: Pages 1, 3, 5, Myron Daniels; p. 6, courtesy of Dr. Elise A. Olsen, Duke University Medical Center; pp. 7, 8, courtesy of Dr. Robert A. Novelline

Drawing: Page 4, courtesy of Donna Wilson, Respiratory Care Consultant

Students in PT who interned at the MGH were under her purview.

From the very beginning of her career in physical therapy, Dr. Purtilo realized that the lives of patients she treated had often been devastated through accidents, stroke, a pulmonary clot, etc.

"What I was seeing often was not simply a medical incident," she said. "Something much more profound was taking place. Many of the patients hardly seemed to be the same individuals as before."

Student interns returning for seminars raised the same kinds of questions about what Dr. Purtilo termed "the broader human issues in health care."

Her work for Project Hope in an economically depressed area of Colombia with her husband, Dr. David T. Purtilo, a pathologist, brought questions of ethics into even sharper focus and led her back to school to study this new specialty.

After earning her doctorate, Dr. Purtilo spent 14 months as a Visiting Scholar in Ethics at the Karolinska Institute in Sweden where she helped develop a medical ethics curriculum. Upon returning she served from 1980 to 1982 as Associate Professor of Health Care Ethics at the MGH Institute of Health Professions. She left to join the University of Nebraska.

In her new role at the MGH, Dr. Purtilo consults on ethics issues on which there has not yet been clear medical or legal guidance. The discussions with doctors, nurses, and others who comprise a web of hospital interaction on behalf of a patient are conducted only at their invitation.

"I am called by people requesting one more small window of expertise in a very complex situation," she said. "I provide as much understanding of the moral issues involved as I can, and then I withdraw. In all cases, the final clinical decisions are made by the people who are in the front lines."

A second major component of her new position is membership on MGH policy-making committees.

"Often, policy is the level at which fundamental issues need to be addressed," she said. "If we had policies to cover situations, there would be fewer case consultations.

"Policies do require generalization, however. Many of the situations I get involved in are just too new or too complex to lend themselves to a policy."

Dr. Purtilo said that for the most part the primary decision-makers obtain input whenever possible from the patient and, if necessary, from the patient's family.

Dr. Ruth Purtilo explains the role of the ethicist to students at the MGH Institute of Health Professions.

"The relatives may not be technically qualified," she said, "but no one is more involved in the decision. Also, we all agree that the family is a very important source of information."

More than three quarters of the states legally recognize the living will, a document which enables a person to specify whether extraordinary or "heroic" measures should be used at the time of terminal illness to prolong life. Massachusetts is not one of those states.

"The adopted wills are not consistent in their provisions," Dr. Purtilo said. "Some are very elaborate, others very general. Some bind a physician to a decision more than others."

Dr. Purtilo consults on ethics issues on which there has not yet been clear medical or legal guidance.

She cited the two most important aspects of the living will. It must be drawn, she said, at a time when everyone agrees that the patient is sufficiently competent to express his wishes. Second, it must be specific. If the patient says, "I don't want to go on one of those machines," is he ruling out a heart monitor, a respirator, a CT (computed tomography) scan?

"I once saw a living will that was 21 pages long," Dr. Purtilo said. "It was made out by a physician. Since he knew very well what he wanted, he covered all exigencies. Most of us aren't that sophisticated. Nonetheless, I think the living will can be an important communication tool between patient and physician."

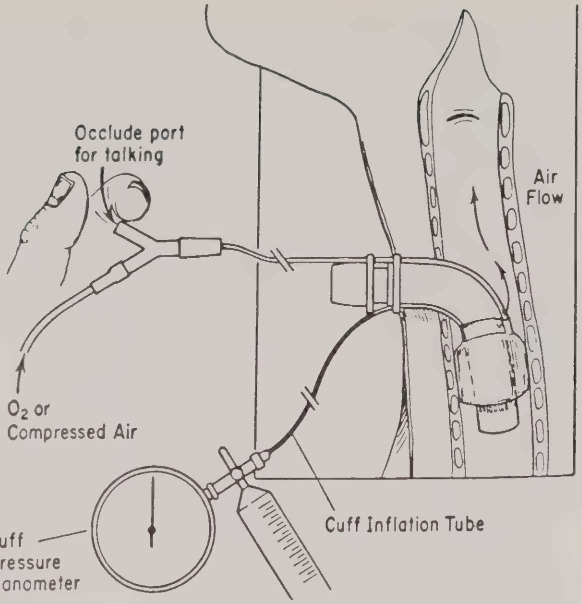
Dr. Purtilo said the march of applied science is taking people into arenas that they never imagined. Technologies become obsolete sometimes before they are fully tested. And medical specialization has grown so fast that the body, in effect, has become a cornucopia of parts.

Thus, the need has been created in medical institutions for a person trained in ethics to look at conflicting beliefs and to help in the weighing process.

"We are a moral society," said Dr. Purtilo. "The ethicist takes deeply held beliefs, looks at them one step removed from those who hold them, and says, 'This is what I hear you saying. This is where the common ground is, and these are the points of moral conflict. This is what convention would support. And these are the new aspects of the situation.' From such an analysis come suggestions."

Dr. Purtilo said there are times in her job when she thinks that if she were responding appropriately as a human being she would be moved to tears over the suffering she sees.

"But I think as an ethicist I have a function that helps to mitigate that suffering," she said. "Often it's reassuring to a patient and family just to know how much thoughtful consideration is being given to a complex clinical decision. Nonetheless, sometimes when things don't work out I think of all the people who did their best and wonder, 'How could each of us have done better?' There aren't always clear answers."■



In this side view of a tracheostomy which permits mechanical breathing support through a patient's windpipe, special tubing can be seen which enables the patient to gain air in his vocal cords (see arrows) in order to speak.

Ventilator Undertakes Work of the Lungs

(Continued from Page 1)

storage of deadly insecticides is a common peril in American homes.)

The ingested liquid would flow to the stomach, then into the intestines where it would be absorbed into the bloodstream. Once reaching the lungs, the poison would begin to kill air sacs and impair the ability of the organs to provide oxygen to the blood and dispose of carbon dioxide (CO_2).

Gasping for breath and turning blue around the lips and fingernails, the patient would be rushed to a hospital and placed immediately on a ventilator, or respirator.

With a tube extending through his mouth or nose and down his windpipe (trachea), the ventilator would pump oxygen-enriched air into the lungs and remove the CO_2, in effect taking over the customary function of the breathing organs.

As the ventilator does its job, the body, if otherwise healthy, can work to rid itself of the toxic substance. This can be a lengthy procedure, but barring complications the patient in time will be gradually weaned from the ventilator to continue recovery on his own. Often at the end of one year, lung function will once again be normal, or nearly so.

The same outcome could apply to patients with lung failure from other toxins, chest trauma, influenza, or pneumonia. Many ARDS patients, given the same supportive care, achieve complete recovery.

"One of the limits we have in treating respiratory failure is the extent to which we can safely use oxygen," said Dr. Taylor Thompson, a member of the MGH's Pulmonary Unit and Director of its Bronchoscopy Service. "In order to get oxygen into the body, we have to employ somewhat higher concentrations than found in room air. But we must stay within certain limits because oxygen itself can be harmful."

When used for a lengthy period at concentrations of more than 50 percent, he said, oxygen will combine with other substances in the blood to form molecules that destroy lung cells. The body has mechanisms to guard against such molecules, but the defenses can be overwhelmed.

Restrictions also apply to the amount of time that a person should be subjected to oral or nasal intubation. If a patient requires ventilator support for longer than three weeks, continued use of a tube through the mouth or nose could lead to scarring on the trachea and the vocal cords.

As an alternative, surgeons can create a small hole (tracheostomy) in the windpipe. The precious breathing support from the ventilator can then be targeted directly at the trachea.

"With a tracheostomy, patients can eat normally once again, even while the mechanical ventilator breathes for them," Dr. Thompson said. "And with specially designed equipment available at the MGH, the patients can also talk."

A small tube on the tracheostomy tube itself is filled with air and pointed upward toward the vocal cords. By operating a valve, the patient can force the air through the vocal cords to make speech possible.

In discussing the limitations of supportive care, Dr. Thompson stressed that it can do only so much for one whose respiratory failure occurred after some condition undermined the basic architecture of the lung.

Emphysema destroys the architecture, for instance, and is irreversible. "If a patient with emphysema developed pneumococcal pneumonia and consequently respiratory failure," Dr. Thompson said, "the best we could do would be to get him through the pneumonia which is reversible and return him to the state he was in before the pneumonia struck."

With other pneumonias, the outcome might be different. Some people can shake off viral pneumonia as if it were little more than a common cold, but in others, this illness can severely scar the lung and cause destruction of its basic framework.

Similar damage can result from a condition known as Friedländer's pneumonia. Caused by virulent bacteria, it is a malady that alcoholics sometimes get.

Each year, many Americans are stricken with influenza, but by taking simple, common sense steps, such as going to bed, keeping warm, and drinking plenty of liquids, they usually recover in about five days.

A person with heart failure who also develops the flu may not be so lucky. With the added complications imposed by the flu, the patient's breathing is likely to become more labored. Excess fluid may fill the lungs and swell the ankles. Climbing a flight of stairs may prove exhausting.

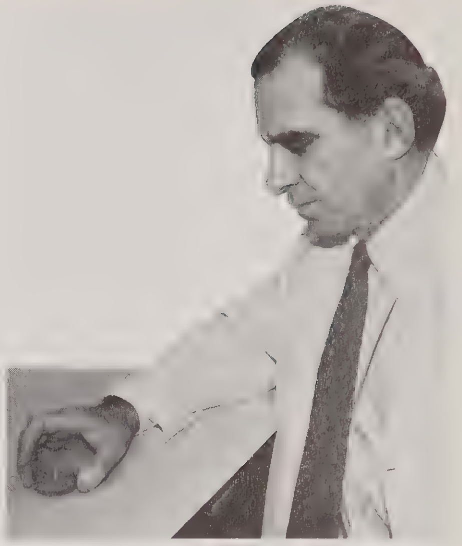
Under these stresses, respiratory failure may occur and the patient's physician would then prescribe the use of a ventilator. Such support would also ease the stress on the heart, but the heart's primary malfunction would remain.

Respiratory failure can occur even though the lungs are perfectly healthy. To inhale air and exhale carbon dioxide, the lungs need muscle power. When the muscles serving the lungs weaken, the bellows function of the organs also breaks down.

Of the nearly 29,000 people stricken with polio in the nationwide epidemic of 1955, 13,850 had some form of paralysis (*MGH News,* December 1975). Many who suffered respiratory failure because of muscle weakness were saved from death by lying in a device called an iron lung. In this cylindrical metal chamber, air pressure forced the chest to expand and contract.

Today, muscle weakness causing acute

Exploring New Tactics to Fight Baldness



Dr. Howard Baden studies the effects of minoxidil on cultured epithelial skin cells.

Hair is the fastest growing part of the human body, but one need not look far to find someone whom nature has shortchanged.

Up to 95 percent of the hair loss suffered by millions of Americans can be attributed to heredity, hormones, or aging, or a combination of the three.

Most people accept baldness as normal. Others take a different view. They see even partial baldness as a detriment to appearance, hampering chances for meaningful social relationships and occupational opportunities.

In ancient days, citizens of Greece and Rome traditionally combed their hair forward to try to mitigate a receding hair line. Romans looked upon baldness as a deformity. Those with the "affliction" took to wearing wigs. A formula purporting to cure baldness was once found in Egypt in an old pharoah's tomb.

For some, advances in technology may soon lessen the present-day concern over hair loss. A drug which appears to promote hair growth is waiting in the wings for licensing by the federal Food and Drug Administration (FDA). Its advisory committee already has recommended approval.

Dr. Howard P. Baden, an MGH dermatologist and Associate Chairman of the Department of Dermatology at Harvard Medical School, said there is no question that the drug called minoxidil has a measurable effect on hair growth, but he cautioned:

"People think too much in terms of black and white. **The drug is not a panacea.** Even for those it helps, it won't stop baldness but only slow it down."

He said the success of the preparation depends upon the age of the user and the severity of the baldness. Someone with a lot of baldness probably would get poor results. Someone younger whose hair is just beginning to thin probably would benefit most.

Up to 5 percent of users develop a minor itch or rash. Charges have also been heard that prolonged use of minoxidil increases the heart rate of healthy young men. The manufacturer disagrees.

A number of questions about the usefulness of minoxidil remain unanswered. No one knows, for instance, how long a person who does develop new hair will keep it.

Many people anxious for denser locks may prefer alternatives to drugs. Today's hairpieces, for instance, are often custom-made and fitted. They look very natural but are not inexpensive.

There are also surgical procedures. Small "plugs" of skin bearing hair follicles can be moved from the sides and back of the head to a balding area where the transplanted hair will usually resume growth, filling in the bare patches.

Such transplants, however, require a

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respiratory failure is usually a manifestation of an affliction called Guillain-Barre syndrome (*MGH News,* December 1969). Guillain-Barre, which can paralyze the entire body, has been seen to follow a number of viral illnesses, including influenza.

The lungs in the Guillain-Barre patient are normal, but the respiratory muscles (the diaphragm and chest wall muscles) cannot do their job effectively. Although most of these patients recover, the illness is fatal in about five percent and causes some degree of permanent paralysis in another five percent.

Dr. Thompson, who is also Instructor in Medicine at Harvard Medical School, said:

"It is clear from the statistics that despite the technological advances made in ventilatory care and invasive monitoring techniques, we still do not impact significantly patients with overwhelming lung disorders."

But he added:

"With respect to patients with less than overwhelming lung injuries and illnesses, the medical profession has improved outcomes markedly.

"Even though many irreplaceable air sacs may be destroyed, we know from radiologic and other data that the lungs often do regain virtually normal function. There may be some subtle abnormalities suggesting residual scarring, but in most respects the quality of life is once again excellent."■

Dr. Taylor Thompson examines 75-year-old Mary Ford of Cambridge, Mass., who was hospitalized with a pulmonary condition.

This man developed new hair while taking part in a 12-month study of minoxidil as a hair growth stimulant.

Interest Focuses on a Drug to Grow Hair

(Concluded from Page 5)

number of surgical sessions and can run into thousands of dollars.

Another surgical hair-restoring method is called scalp reduction. Part of the hairless portion is surgically removed. The remainder is then pulled together and stitched, effectively shrinking the bald spot. Since older men have looser, more pliable skin, they seem to benefit the most from this technique.

Although these and other methods draw considerable interest, the apparent ability of minoxidil to promote hair growth has captured the imagination of a vast audience.

A product of the Upjohn Company of Kalamazoo, Mich., minoxidil originated in the early 1970s as a treatment for high blood pressure. At first, the company regarded the drug's tendency to stimulate hair growth as a disturbing side effect. Then the firm recognized the new potential of the medication.

In 1983, a large-scale study was conducted of a lotion containing 2 percent minoxidil. At 27 locations across the country, 1833 bald or balding men began rubbing the lotion into their scalp twice a day. At the end of a year, researchers found that many of the participants had grown new hair.

In about a third of those studied, the growth was moderate. In another third, the new hair consisted mainly of "peach fuzz." In the remaining third, the drug failed to do anything.

Since the number of American men affected by male-pattern baldness totals between 30 and 50 million, benefits realized by even one third would be a major advance.

Dr. Baden said women should benefit from minoxidil's hair-stimulating effect as readily as men. "Most researchers today feel that female pattern baldness is equivalent to that of the male," he said. "So if the disorder is the same, the drug is likely to work for both sexes."

The MGH dermatologist said women experience thinning of hair less frequently than men, also at an older age and in a different distribution. But the family histories of such women reveal the same genetic backgrounds as those of men with thin hair.

The Upjohn product has already been licensed in Canada and in parts of Europe and South America.

One of the basic questions that spurred early studies on minoxidil was whether topical use of the drug would affect blood pressure. After all, minoxidil is a potent vasodilator designed to open blood vessels and let more blood through. The studies showed, however, that when a 2 percent minoxidil solution is applied to the skin, the blood absorbs an amount of the drug equivalent to only about 1 percent of the minoxidil derived from antihypertensive tablets.

"Minoxidil was originally tested at a concentration of 1, 2, and 3 percent," Dr. Baden said. "The data showed that 1 percent was not good enough and that 2 and 3 were probably equivalent in effect. But with 3 percent the absorption of minoxidil into the blood began to increase. This would not harm the individual with normal blood pressure, but what about the person whose pressure is high, especially the one who is not aware of his condition? We had to make sure the topical drug was safe for everyone."

During the original tests, a few people used a 5 percent minoxidil solution. Some allegedly claimed hair growth in areas other than where the lotion was applied, apparently the result of elevated blood absorption of the drug.

Applied in a 2 percent solution and as prescribed, minoxidil should confine hair growth to where it is wanted.

"Of course, one can overdo use of the drug, applying it many times each day," Dr. Baden said, but he added, "That habit would be quite expensive."

How does minoxidil work as a hair growth stimulant? Despite extensive studies, no one is quite certain.

Hair loss in men and women alike requires the presence of active male hormones, but it has been shown that minoxidil has no effect on the pathways of male hormone production or action.

When rubbed into the scalp, the drug does generate increased blood flow through the skin. Since actual blood flow to the hair cannot be measured, however, any role of blood in promoting hair growth is only a theory.

In his MGH laboratory, Dr. Baden has cultured epidermal (outer layer) skin cells which give rise to hair, nails, sweat glands, etc. He noted that as the cells reproduced they piled on top of each other. Allowed to remain like that for a long enough time, the cells died.

When Dr. Baden added minoxidil to such cell cultures, the cells remained alive twice as long in the confluent state.

"Maintenance of the confluent state may be one explanation of how hair cells themselves function," the doctor said.

The public interest shown in the hair-restoring qualities of minoxidil has led researchers to study the possibility of developing rival products.

Some investigators believe that if a topical preparation contained prostaglandins it might elevate blood flow to the hair and make it grow. Prostaglandins are natural substances which have widely varying regulatory effects in the body.

Since male and female pattern baldness is mediated by male hormones called androgens, at least one company is working to develop a topical anti-androgen product.

Dr. Baden commented:

"I think it's safe to say that a lot of people are going to throw their 'wigs' into the arena."■

People Swallow All Sorts of Odd Things

An elderly widow sat reading a newspaper in the kitchen of her home in southern Maine one Sunday afternoon and decided to have a snack.

Reaching into her refrigerator, she took out a bowl containing five prunes and ate all while continuing to read.

When she finally put the newspaper down, she glanced, then stared, at the bowl. Certain that it had held five prunes, she counted only four pits. At the same time, she felt a pain in her chest.

The woman, who lived alone, summoned a taxi to take her to a nearby hospital, but an X ray showed nothing wrong.

Convinced that a pit had become caught in her food pipe (esophagus), she instructed another cab driver to drive her to Boston and the MGH Emergency Ward (EW).

There, Dr. Robert A. Novelline, then a Radiology Resident, listened to the woman's story. Aware that the composition of a prune pit did not permit X-ray detection, he put the patient under a fluoroscope, a radiologic device for monitoring internal activity, and had her swallow some bread soaked with barium.

Whitened by the barium and thus easily visible on X ray, the bread came to rest on the pit, verifying its presence.

Before Dr. Novelline could arrange for its removal, the patient became very excited and retched. The breaded pit shot out of her mouth and flew across the room.

Delighted that her ordeal at last was over, the woman gave Dr. Novelline a big hug and later sent him a homemade blueberry pie.

Now the Director of the EW's Emergency Radiology Section, Dr. Novelline said no age group is spared from ingesting foreign objects, but the phenomenon is most common among children.

"Given the chance," he said, "children under three would swallow the world. Older youngsters often delay informing their parents of a swallowing incident because of embarrassment or fear of being chastised. When the truth is finally told, the parents may become more concerned than the child, usually unnecessarily."

Dr. Novelline told of a worried couple who brought their 10-year-old son to the EW. The father looked rather sheepish as he addressed a young lady at the registration desk.

"Look, we don't know whether to believe this kid or not," he said. "Our son claims he swallowed a coin. He looks okay and says he feels fine. Can you people check him out?"

An X ray revealed a Lincoln-head penny in the boy's stomach. The parents immediately had visions of their son being wheeled into an operating room. But instead all were sent home with assurance that nature would undoubtedly take care of the problem.

"Since the boy felt well and the coin was round and relatively small, I was pretty certain that it would soon be excreted without causing any harm," Dr. Novelline said. "The parents were advised to bring their son back if he began to feel sick."

A small swallowed coin, such as this penny seen on X ray in a patient's stomach, usually passes through the body without causing harm.

While the ingestion of foreign objects is usually accidental, some adults commit such acts deliberately. Several prison inmates have undergone surgery at the MGH for ingesting razor blades. The prisoners preferred a hospital room to a jail cell.

One inmate who underwent surgery had wrapped tape around the metal blades to make sure he would not cut himself. He knew that the tape would not be detected on X ray. He got his operation and a two-week hospital stay.

Psychotics and malingerers have been known to swallow an incredible array of items, such as nails, needles, safety pins, thumb tacks, paper clips, and broken thermometers.

"The most common swallowing problem presented by adults in the Emergency Ward involves meat lodged in the esophagus," said Dr. Paul C. Shellito, who specializes in gastrointestinal surgery and in endoscopies, internal visual examinations employing a special lighting [fiberoptics].

"Sometimes, after the meat becomes trapped, the patients learn for the first time that they have a stricture, or narrowing, of the esophagus," Dr. Shellito said. "That is how esophageal cancer occasionally makes itself known. The narrowing by the cancer may not have been severe enough to be noticed until this swallowing episode demanded medical attention."

An esophageal blockage, whether caused by a chunk of meat, a fish or chicken bone, or the like, can usually be cured quickly. An endoscope, equipped with a grasping forceps or a wire snare, can be introduced through the mouth to grab and remove the offending object.

If the swallowed item slipped into the windpipe (trachea) instead of the esophagus and traveled down the airway to the lungs, a pulmonary specialist would extract the object with a bronchoscope, similar to an endoscope.

If the item were plastic and had lodged in the lung tissue known as the bronchial tree, a CT (computed tomography) scan might be performed to find it. Unlike standard X ray, CT can differentiate subtle differences in density between normal tissue and plastic.

While the bronchoscope has specific uses in the airways, an endoscope can be extended all the way down the esophagus into the stomach and from there into the duodenum, the first part of the small intestine. But on rare occasions even if a particular trapped object could be extracted by this instrument, surgery might be preferable.

"If police were closing in on someone for possession of cocaine, for instance, that individual in a desperate attempt to hide the evidence, might very well swallow the packet containing the drug," Dr. Shellito said. "Removal with an endoscope could rupture the plastic bag and give the patient a massive drug overdose. I would elect to operate instead."

The treatment of choice for someone who has swallowed a foreign object is generally to identify the object first and then use X rays to follow its progression through the body.

"It's incredible the size and shape of things that will pass," said Dr. Shellito, who is also Assistant Professor of Sur-

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Sharp Swallowed Objects Cause Anxiety

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gery at Harvard Medical School. "It's only if their progression stops that one really becomes concerned."

If an item swallowed by an adult were small and round, the doctor said he might not even order an X ray but simply reassure the patient that nature will handle the problem. But he also advises such patients, "If you develop any pain or fever or distention, call me right away, and I'll see you in the Emergency Ward."

Dr. Shellito recalled a patient who said that in downing a drink he had swallowed a fragment of broken glass. The patient felt fine, but this was a situation that mandated X rays. The fragment, which contained enough lead to be visible on film, was found in the jejunum, the second portion of the small intestine. Although about two inches long and with sharp edges, the glass passed unimpeded through the patient's body.

People sometimes swallow false teeth. Dr. Shellito had a patient who gulped down a bridge about two inches long. It passed easily. The doctor remembered that the patient was less concerned about the possible hazards than in getting his teeth back.

Dr. Novelline, who is also Associate Professor of Radiology at Harvard Medical School, said that if a swallowed object has a point, like a pin, nail, screw, or piece of glass, there are several places in particular where it might lodge.

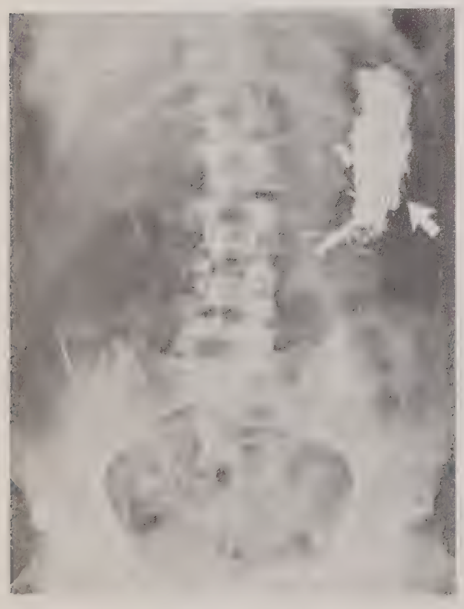
"The object could get caught in the pharynx [throat] or in any of a number of valves," he said. "There are valves between the esophagus and the stomach, between the stomach and the duodenum, and at the junction where the small intestine joins the large one [colon]. It is uncommon for an object to become lodged in the colon itself since its channel is rather large."

If something sharp endangered the intestinal wall, a surgeon would operate at once to remove the object. If the lining became perforated, peritonitis and then death could result.

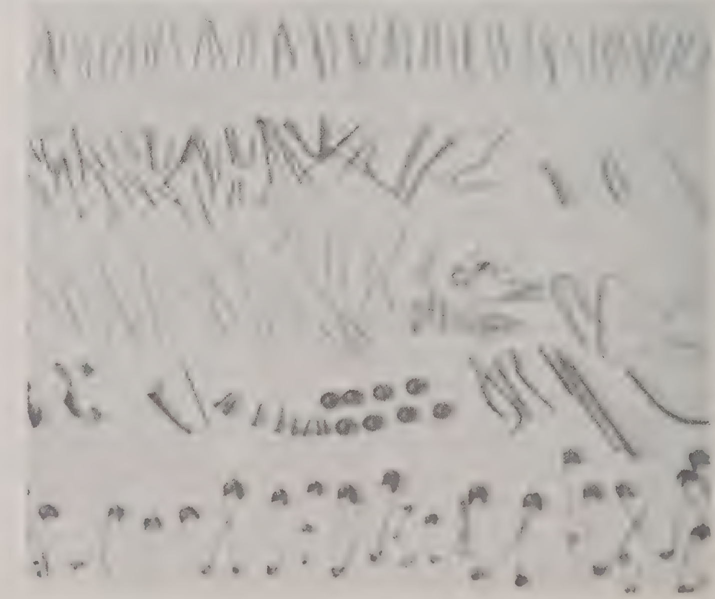
Modern technology has given doctors a new concern. Children and adults alike have received emergency care for ingesting small batteries, the kinds that power hand-held calculators, cameras, and watches. Some types are small enough to pass quickly through a person's body. But others are large enough to lodge in the esophagus and other narrow places, creating a potentially lethal condition.

The principal danger comes from corrosion of the swallowed battery and leakage of its noxious chemicals, particularly potassium hydroxide, into the gastrointestinal tract.

Tests in which batteries were immersed in a solution simulating gastric contents have showed corrosive battery action starting within hours.■



At left is an X ray of a patient who swallowed 287 metallic and glass objects. Doctors removed a tangled mass (see arrow) from her stomach and other objects scattered throughout the intestinal tract. At right are some of the items retrieved.



MGH News

Massachusetts General Hospital, Boston, Massachusetts Vol. 47 No. 3 April 1988

A Proposed Way to Forecast a Language Handicap

Six visits to study stone age populations in remote areas of New Guinea and Indonesia have led an MGH neuropsychiatrist to propose a way of forecasting a child's disability which tends to be overlooked.

Some 25 million Americans are said to have dyslexia, a language limitation characterized by poor reading and/or writing skills. In two thirds of those affected, the problem is verbal dyslexia, inability to process information received mainly through the ear. The remaining one third have spatial, or visual, dyslexia. They cannot sufficiently organize visually received data in a proper relational way.

It is the child with spatial dyslexia who often misses out on treatment. The work of Dr. Anneliese A. Pontius over the past 17 years has resulted in a simple test—the drawing of a face in a frontal view—which she says can be an early indicator of spatial dyslexia.

"There has been an enormous increase in dyslexia in western countries," Dr. Pontius said, "but often children are grouped and treated as if they all have difficulties translating something they heard into something they write.

"During the recent past, many youngsters were taught to read a whole word rather than first learning to put together the parts that make up the word.

"The letters 'W' and 'M,' 'N' and 'Z,' and 'b, d, q, p,' for example, look alike. But their position—sideways or upside down—reflects their identity. The spatial dyslexic finds difficulty with such spatial representations."

Dr. Pontius' special interest in dyslexia began by chance in 1971 when she and her husband, Dieter, were traveling by houseboat along the 700-mile Sepik River in New Guinea. At the time, they were simply curious about how people of other

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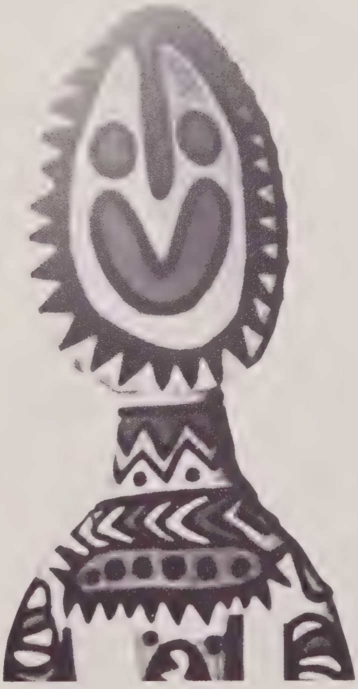

The sacred art of certain stone age people may have improved ways of detecting an often overlooked disorder in children.

Medical Interviews: Vital for Collecting Facts on Illnesses

To diagnose illness and plan treatment, budding physicians learn quickly from their mentors that medicine is not only a science but also an art.

In an initial meeting with a patient, a doctor's first concern—before he performs a physical examination or orders a laboratory test—is the gathering of information.

What is bothering the patient? When did the pain begin? Describe the discomfort. What does the patient think is wrong? What reason does he have to think so? How does he expect the doctor to help?

Through such sleuthing, the physician develops a basic understanding of what is going on, learns about what the patient is like, and can begin to set a course leading to a definitive diagnosis and more—a program of care that is tailored to the needs of the individual patient.

"There is an old dictum that, in the doctor-patient interview, the alert physician listens not only to what the patient says but also to how he presents his story," said Dr. John D. Stoeckle, Chief of the Medical Clinics at the MGH.

"Does the patient, for instance, act angry or resentful? Does the patient deny, minimize, or dramatize the severity of symptoms? By focusing on such details, the physician gains important insights into the kind of individual with whom he is dealing."

On occasion, a patient's central complaint overshadows a deeper, more important concern.

"The person with multiple concerns may mention only one first to see how the physician responds and then, if all goes well, will share matters that are perhaps more personal," said Dr. J. Andrew Billings, another MGH internist.

How the physician conducts the interview is crucial from the patient's point of view because it is largely on the basis of this interaction that patients decide whether they are satisfied with the doctor. Failure of the doctor to meet patients' expectations often results later in a significant reduction of compliance with medical advice.

Dr. Billings listed two common short-

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EDITORIAL:

A Time for Ethicists

In the last few years a small number of medical centers have added ethicists to their staffs. Some are physicians who practice medicine in addition to acting as ethicists. In Ruth Bryant Purtilo, the MGH has hired an experienced full-time ethicist, who will serve both the hospital and its MGH Institute of Health Professions.

It is clear that issues like whether to remove a hopelessly ill patient from life-support systems might cause a physician to consult an ethicist. Eleven years ago the MGH reported the development of a committee of physicians and allied health professionals to consult in similar situations. But there are many other kinds of problems that cry out for an ethicist's help.

Some touch very sensitive areas: Should fetal tissue ever be used in research? If so, under what circumstances? Is it ethical to keep an infant lacking a brain "alive" until the baby's heart can be transplanted into an as yet unborn infant? Or does this open the door to even more controversial matters? Neurobiologists are approaching the day when it should be possible to cure inherited disorders by replacing a defective or missing gene. Should they? If so, what guidelines are needed? For years some scientists have experimented with brain transplants in nonhumans. Is this something that should ever be condoned in humans? Is it ethical for patients to pay to undergo research (as is done in a Tennessee institution)? Should someone on a waiting list for a transplantation procedure be taken out of turn because of being an important public figure—like a governor or the President? Should surrogate parenting be stopped?

These are a few of the problems that ethicists may confront in the coming years. Some, in fact, are already being faced. Even the most bizarre of the questions posed here are within the realm of *possibility* for the next 20 years or sooner. By having an ethicist on staff, medical centers can begin to focus their thoughts on such issues. But having debates inside medical institutions is not enough. These are problems that society itself must also ponder. In the final analysis it is the public interest that decides what is ethical. If a medical center—any medical center—makes a decision that this nation is not ready for or will never be ready for, public pressure will ultimately prevail. Ethicists and hospitals can promote and lead the discussions. It is because medical ethicists bring special training and a great deal of thought to these trying issues that we listen to them so closely. Their numbers are certain to increase.

Medical Interviews

(Continued from Page 1)

comings of physicians as failure to let patients tell their story fully and giving insufficient explanations to patients.

Drs. Billings and Stoeckle coauthored a handbook for medical students entitled, *Introduction to the Clinical Interview in Ambulatory Care.* In the manual, the authors advised students:

"In general, you will want to begin your interview with broad, open-ended questions that allow the patient latitude in describing the complaint.

"Allow time for the history to emerge. If the patient pauses, don't feel that you have to jump in with a question. If you wait attentively, your silence will usually prompt the patient to continue to elaborate about the complaint."

Later, the interviewer can encourage the patient to be more specific about important topics, such as chest pains, headaches, or dizziness.

Some other advice for the interviewer:

Avoid rapid-fire multiple questions that could confuse the patient and lead to inadequate responses.

Do not expect the patient to understand technical jargon, such as M.I. (myocardial infarction) when it is just as easy to say heart attack.

If patients use medical terms, do not take it for granted that they really understand the meaning.

When patients come to the doctor's office, they are generally worried about their health. In their manual, Drs. Billings and Stoeckle cautioned students:

"When you find yourself particularly tense in an interview, you may be responding to the patient's high level of anxiety.

"If you can acknowledge and explore your patient's concerns and can show that you respect the patient's feelings and fears, the intensity of his or her distress will usually be greatly diminished."

A family history of serious illnesses or afflictions causes many patients particular concern. They are likely to fear that they will one day develop the very maladies

Photographs: Pages 1, 4 (upper), courtesy of Dr. Anneliese Pontius; p. 4 (lower), from Early American Gravestone Art in Photographs, by Francis Y. Duval and Ivan B. Rigby; pp. 3, 5, Myron Daniels; p. 7, courtesy of Betsy Wilson; p. 8, Jean Firth Tyng

Drawing: Page 6, from International Conference on the Ilizarov Techniques

MGH staff personnel who supervise medical interview and other training for students and Residents in primary care programs include, from left, Drs. Andrew Billings, Carol Ehrlich, John Stoeckle, Arthur Barsky, and Allan Goroll.

that their parents, grandparents, or siblings contracted. Such fears often deserve particular attention.

"Patients want reassurance that whatever is ailing them is minor and will run its course," said Dr. John D. Goodson, also an internist at the MGH. "They like the certainty of tests.

"Even if it turns out that a serious condition has developed, the patient wants the comfort of knowing there is someone to turn to."

Dr. Goodson said that simply talking to a patient sometimes leads to a diagnosis quite different from what the patient expected.

Based on prior ideas or on advice from family and friends, a patient might seek help for indigestion caused by a food problem. The interview could indicate to the doctor, however, that the indigestion, or epigastric discomfort, is not related to food at all but rather to exertion. This raises the possibility that the condition is heart-related.

The physician might order certain tests to determine whether other factors are present to strengthen a diagnosis of a heart condition. One such factor could be a high cholesterol level.

"The physician works with the patient to achieve as complete a description as possible of what is going on," Dr. Goodson said. "In that process, the doctor thinks about what he is hearing and tries to put that together with what he knows about illness.

"If in forming a diagnosis, the doctor runs into inconsistencies in either his examination or in laboratory findings, he has to take a few steps back, review the patient's history, or try to think of what other disease states fit the problem. A successful outcome depends on the doctor's ability to make good, solid contact with the patient."

Patient visits to doctors' offices range from an average of 20 to 30 minutes with internists in the United States to only three to six minutes with physicians in countries such as Britain and the Netherlands. Only 10 to 20 percent of office visits, however, are by patients seeking to talk to a doctor for the first time about a problem. The time of returning patients is usually taken up with management of old problems rather than seeking new diagnoses.

Dr. Stoeckle, who is also Professor of Medicine at Harvard Medical School, said studies of the decision-making process indicate that the physician often reaches a diagnostic hypothesis within the first five minutes of an interview.

The public (from surveys), social critics, researchers of communication and interpersonal relations, quality assurance committees, and some of the medical profession itself (as educators and practitioners) all argue that skills in interviewing and in overall doctor–patient relations need to be improved. Indeed, assessing competence in the interview, like assessing skills in procedures, is being proposed by the Board in Internal Medicine.

In this regard, the Society of General Internal Medicine sponsors a number of courses on interviewing for those who teach it. In June, the society will conduct such a course at Harvard Medical School and at the Brigham and Women's Hospital in Boston.

Drs. Billings and Stoeckle also have completed a book entitled, *The Clinical Encounter,* due out late this year.

At the MGH, several staff members are active in organizing teaching programs. Internists and psychiatrists regularly coteach small groups of students and Residents. Participants meet with actual patients, usually outpatients, and also act out roles in theoretical settings.

Videotapes play an important part in the educational process. "We've been using videotapes since 1967," Dr. Stoeckle said. "They provide the learning practitioner a chance to see and hear himself or herself, to self-reflect on communicative behaviors, and, with encouragement and advice, to change these if needed."■

For a better understanding of what may be bothering a patient, Dr. John Goodson not only listens to facts the patient presents but also how the story is told.

Dr. Anneliese Pontius of the MGH visits a village of stone age people in a remote section of New Guinea.

Can a Drawing Point to Spatial Dyslexia?

(Continued from Page 1)

cultures lived.

"Communities along the lower and middle parts of the river had been missionized since the turn of the century," she said. "The area was abundant with beautifully carved sacred art. Faces on ritual masks showed accurate proportions.

"Such was not the case with people living farther on in the upper part of the Sepik. They had no formal schooling and lived almost as if back in the stone age. Their area was not even open to visitors until the 1960s. I was interested immediately in their carvings because I had never seen such faces before except worldwide in neolithic art which in western Europe would date from some 4,000 years ago."

A principal characteristic of neolithic art is absence of any indication of the bridge of the nose. The nose simply looks like a vertical continuation of the forehead.

Dr. Pontius had residents of many villages draw a face. Sixty percent drew a neolithic face. The percentage closely matched the known illiteracy rate among these people as determined earlier by UNESCO through direct testing.

Later, back in New England, Dr. Pontius, who is also Associate Clinical Professor of Psychiatry at Harvard Medical School, began a survey of some 1,500 gravestones with frontal face engravings that were erected between 1630 and 1800. About 20 percent were done in the neolithic style. The known illiteracy rate in those days was 20 percent for artisans.

From her observations of a relationship between illiteracy and the depiction of faces, the neuropsychiatrist extended the link to dyslexia when she went to Heidelberg, Germany, as a visiting university professor in neurology. In the local public school system, she studied 90 children enrolled in classes for dyslexics. At her request, the students drew faces, and 38 to 40 percent of the drawings proved neolithic. The testing was repeated twice without change in the results.

Dr. Pontius emphasized that for a child to be diagnosed as dyslexic the youngster must be of normal intelligence, and the poor reading and/or writing performance must be at least two years behind that of nondyslexic classmates.

In subsequent trips, Dr. Pontius conducted repeat tests among the New Guineans and also studied people living in very remote areas of Indonesia, Australia, and South America.

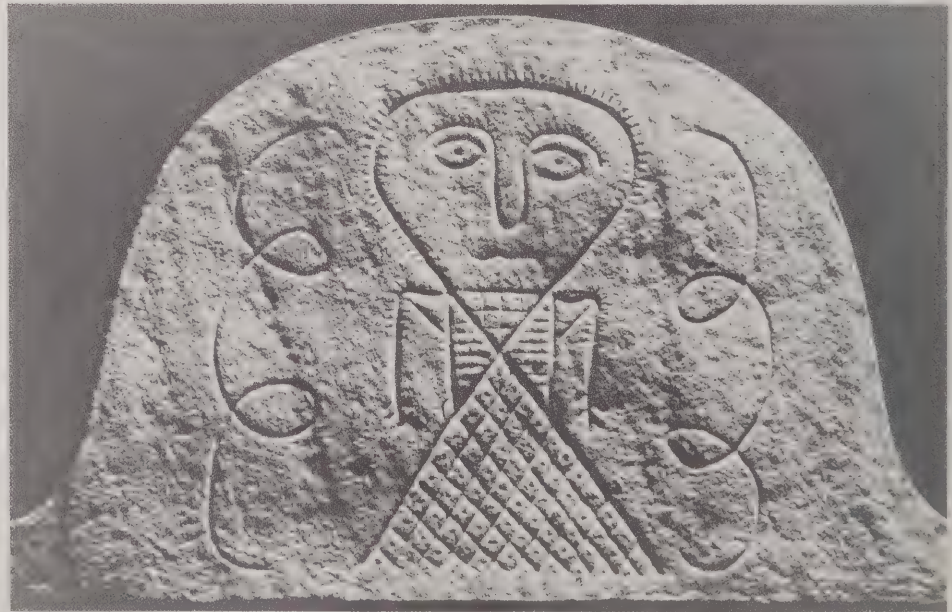
In Australia, she visited seven settlements in the country's Northern Territory, a bleak, desert region. In a study of 269 children, all of normal intelligence but at least two years behind in reading and writing, 85 percent had some form of dyslexia. Of that group, 35 percent drew neolithic facial pictures.

An Australian researcher criticized Dr. Pontius' contention that face drawings could serve as an indicator of spatial dyslexia. He said the children in the Northern Territory did beautifully remembering objects placed on a table.

Dr. Pontius responded, however, that the skills mentioned by the researcher were *interobject;* that is, the objects were the same globally. It made no difference whether an apple was turned right or left, or whether a book was upside down or not.

"Intraobject spatial skills which I have been studying are different," she said. "The face is one of just a few patterns in which many, many things can be represented by just a few signs. In this respect, the written language is much like the face since letters and words can also represent limitless combinations."

Dr. Pontius said there really is no such



The primitive-looking carving on this 1771 gravestone in Williamstown, Mass., is indicative of neolithic art.

Surgeon Lengthens Teen's Short Leg With New Method

Linda Kimball, RN, adjusts the leg brace of 16-year-old Ana Sanabria as her older sister, Carmen Aguirre, looks on.

When Ana Sanabria was born in Puerto Rico 16 years ago, it was apparent that unhappiness lay in her future.

A pretty girl with a loving family, Ana nevertheless had a handicap. She was born with her right leg appreciably shorter than her left.

During childhood, Ana did not let her infirmity complicate her life. She enjoyed dancing and other activities in which children her age participated. But as she grew into a young woman, she became increasingly self-conscious of her very noticeable limp.

Ironically, another misfortune occurred which turned out to be a stroke of good luck. Ana bumped her right knee in her home town of Arroyo, and later while she was visiting a sister, Carmen Aguirre, in Chelsea, Mass., a suburb of Boston, the knee began to swell.

Mrs. Aguirre, who works in the Medical Records Department at the MGH, made an appointment for Ana with Dr. Michael G. Ehrlich, the hospital's Chief of Pediatric Orthopaedics. He repaired a dislocated kneecap, and at the same time he arranged a second operation to lengthen Ana's short leg by 2½ inches.

The teenager was one of the first patients in New England to undergo the technique employed by Dr. Ehrlich. Ana presently is going through the healing process at her sister's home following three months of hospitalization. The young girl moves about on crutches, but soon she should be ready to discard an external device used to lengthen and stabilize her leg and walk normally for the first time.

In the past, lengthening a leg has been a complex procedure, often entailing a series of operations with a high risk of complications. Dr. Ehrlich operated only once on Ana. The technique he used – a method developed in the Soviet Union – not only offers greater benefits for a patient but also poses fewer risks.

(Concluded on Page 6)

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thing as 100 percent illiteracy anywhere in America because children learn to define relationships between parts at a very early age. Patterns on wallpaper help to represent a design in the mind. A clock has hands that move to different points on a dial. Exposure to such subtle spatial interrelations smooths the way for children to later achieve reading and writing skills.

Dr. Pontius observed during her Australian research that the houses she visited in the northern settlements lacked such simple features as wallpaper, curtains, or pictures. Children there never gained the rudimentary insights that could have set the stage for their learning how to represent features such as those of a face.

One of every four preschoolers in our country and in some western European countries draws neolithic faces. But for someone so young, that is normal. A reliable diagnosis of dyslexia has to wait until a child has reached the age of about 8, having already experienced some instruction in reading and writing.

No drawing skills are needed, however, to take the simple face drawing test. The expert analyst reportedly can learn enough from fine distinctions in a drawing to be able to assess a child's chances of developing spatial dyslexia.

The cause of this condition has long been debated. Research suggests a problem deep within the brain, possibly in an area known as the hippocampus, which seems to mediate intraobject patterns.

Work by Dr. Pontius reinforces this belief. She studied 344 undernourished, chronic alcoholics who typically suffered from hippocampal dysfunction and found that 22 percent drew neolithic faces. In a control group of nonalcoholics also studied, only 12 percent produced such faces.

Despite her own and other studies, the MGH neuropsychiatrist said the question of what causes spatial dyslexia remains unsolved. While the small possibility of a brain defect should not be overlooked, she feels that the condition might more frequently be the result of unrealized or underdeveloped potential.

"The symptomatology from underuse," she said, "is the same as that from brain pathology."

Infants smile fastest at neolithic face masks, and a certain brain damage makes faces appear flattened like neolithic faces. This is a striking connection which Dr. Pontius has found in certain dysfunctional syndromes.

Dr. Pontius reported on the face drawing test in Boston this winter at the annual meeting of the American Association for the Advancement of Science.

Another new test also was mentioned. Dr. Martin F. Gardiner of Northeastern University and Harvard Medical School reported that while anyone can tap a finger on a table, the spatial dyslexic has trouble doing so in a particular rhythmic pattern. Dr. Gardiner has thus far tested only a small number of people.

The more extensive studies conducted by Dr. Pontius have stimulated interest. In a California school system, a doctoral candidate has given the face drawing test to young underprivileged children and has reported a large proportion of neolithic-style pictures. At least six other school systems have made inquiries about possible use of the test.■

New Leg Surgery Protects Blood Supply

(Concluded from Page 5)

The shortness of Ana's leg stemmed from some spontaneous disruption during fetal development. But the Soviet technique is also applicable in repairing certain types of severe bone fractures sustained in accidents.

In addition, the procedure vastly expands the degree to which bones can be lengthened. Through the Soviet method, it is now possible to lengthen leg bones by 10 inches or more. Although such an effort could entail two to three years of medical care, many people who are particularly short, say under 4 feet tall, would welcome the attempt.

For significant lengthening, the surgery does require careful contemplation since keeping the body properly proportioned might also require extending the patient's arms.

"In this age of *glasnost,* or spirit of openness," Dr. Ehrlich said, "the bone-lengthening procedure devised by Professor Gavriel Ilizarov of Kurgan in the Soviet Union has been one of the most significant medical developments to come out of that country."

The key feature of the Ilizarov technique is its protection of blood vessels in a bone as it is broken and very slowly separated to make the limb longer. With the vessels still intact, the body is able to manufacture new bone to fill in the gap between the segments.

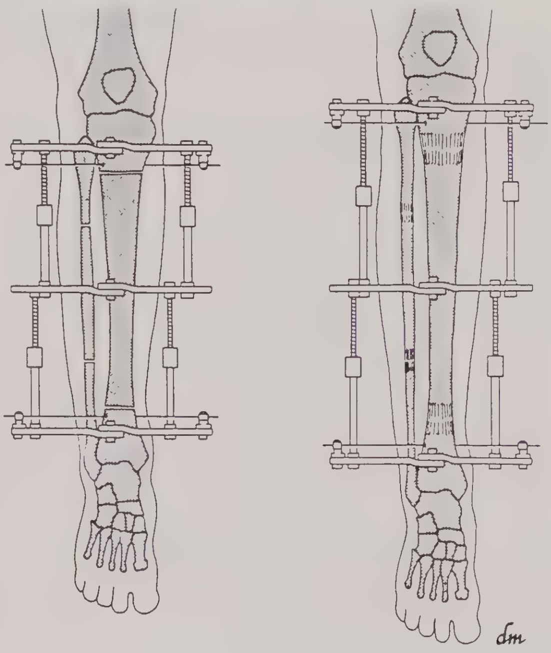
The surgeon prepares the patient's leg for lengthening by feeding very fine wires through the main leg bone (tibia) and supporting bone (fibula) above and below where incisions are planned. Both ends of these wires are then connected to a pair of metallic rings which encircle the limb. Suspended between these rings, running parallel to the leg, are telescopic threaded rods. Manipulation of these rods controls the separation of the bone while the rings keep the leg stable.

The surgeon protects the blood supply coursing through the center of the hollow bone by cutting only the bone's outer layer. Once the cut has been made, the wires rigidly held by the rings can be twisted in opposite directions to complete breaking of the bone while leaving the vessels, and also much of the skin, relatively unharmed.

For a sizable lengthening, the surgical team may break the same bone in two places, permitting two separations. (See diagram.) While comprising a double lengthening, each gap would still be narrow enough to facilitate quick filling in of new bone.

In conventional techniques, when the bone is cut, blood vessels within are also parted and must be reunited. After the bone is separated, the area in between is filled in a second operation with bone obtained from the patient's hip or, on occasion, from a bone bank. A plate has to be attached to the bone to stabilize it during healing. Later, a third operation must be performed to remove the plate.

In the past when bone grafts have filled gaps exceeding two inches, the grafts have sometimes failed after a year or longer, requiring still further surgery.



These sketches depict a double separation of bone for appreciable lengthening of a leg and how braces stabilize the limb as new bone forms. Blood vessels (not shown) are essentially unaffected by the surgery.

Limb lengthening dates from the turn of the century. In that time, numerous innovative devices and procedures have come and gone. In general, Dr. Ehrlich said, the work has been successful, but at the same time it has been fraught with so many difficulties that surgeons have actually come to expect the complications.

Sometimes tendons become too tight and have to be made longer. If the limb is lengthened too fast, circulatory problems often develop.

"One of the fascinating aspects of the Ilizarov technique is that it is based on physiologic principles which we in the West had simply failed to pick up on," Dr. Ehrlich said.

The Ilizarov technique was first reported in 1969 in the Soviet Union. Various applications of the method were subsequently described in hundreds of articles from the professor's institute, but most never reached the West.

The turning point came a few years ago when a well-known Italian skier sought medical help in the Soviet Union for a leg fracture that did not heal. He had also lost some bone, causing the leg to shorten.

After his surgery, including a lengthening, proved highly successful, the skier returned home and spoke enthusiastically about his treatment. He persuaded a number of Italian surgeons to travel to the Soviet Union to learn the new procedure.

Soon the technique came into use at major centers in Italy. Because of a consistently low complication rate, the method was applied successfully to the lengthening of arms as well as legs.

The Ilizarov method was brought to North America not long ago by a Canadian doctor who traveled to the Soviet Union to study it.

Dr. Ehrlich, who is also Associate Professor of Orthopaedic Surgery at Harvard Medical School, estimated that 30 percent of the world's population have legs that are unequal in length by up to a half inch.

"We don't consider that to be significant," he said. "And when the difference is somewhat greater, it is often easier just to stop the growth of the longer leg. We can do that by either scraping out the growing part of the bone or putting some staples across that. It is not a difficult operation."

Short people, however, are likely to object to a curtailment of whatever further growth lies ahead for them. In addition, some patients, such as Ana, do not come to the attention of an orthopedic specialist until they have already reached their full normal height. Thus, for those individuals, the Ilizarov operation fills a need.

"There actually appears to be very wide potential for this type of surgery," Dr. Ehrlich said. "The technique can be applied not only to legs and arms but also to a foot and, in fact, to almost any bone, although where there is a greater presence of blood vessels the surgery does become more delicate."■

Facially Disfigured Organizing to Help Each Other Cope

Betsy Wilson of Concord, Mass., describes herself as "different."

She has felt that way ever since 1972 when an unusual type of lip cancer spread along nerves in her face, requiring removal of one side of her lower jaw.

Although the surgery plus radiation eliminated the cancer and she later received a jaw replacement from a bone bank in Bethesda, Md., Mrs. Wilson lives with a permanent facial disfigurement.

The 55-year-old mother of three calls herself different because, she says, "you don't see many people around with spoiled looks." With their confidence shaken, she said, they tend to shut themselves off from society.

Each year, motor vehicle accidents, burns, cancer, birth defects, and other misfortunes leave a large number of individuals with irrevocable damage to the face.

"The distress to the person concerned and the disturbing effect it can have on loved ones is incalculable," Mrs. Wilson said. "The experience of not being able to communicate in the way we used to, of losing the ability to express our emotions, is something none of us can prepare for, or even understand, until it happens to us or to someone we love."

Realizing that she is but one of many who can be called different, Mrs. Wilson a year and a half ago launched the American branch of a mutual-help society called, *Let's Face It.*

The organization, presently numbering some 200 members throughout the United States, serves as a link between people with facial disfigurement to help them assist each other in understanding and living with their disability.

Members also include parents of young children with facial problems, and professionals, such as doctors, nurses, and social workers, who have a special interest in working with disfigured patients.

Mrs. Wilson is separated from her husband, John, dean of a law school in California, but believes that if *Let's Face It,* of which she is executive director, were in existence in the late 70s when their marriage foundered, the separation might never have occurred.

"Our family had no one else with whom to talk about what my husband and I were going through," she said. "If we had, I really do think the marriage probably would have survived."

Although separated by some 3,000 miles, Mr. and Mrs. Wilson remain close, communicating often, their affection for one another still intact.

Let's Face It originated in England three years ago. The organization was founded by Christine Piff of Crowthorne, Eng., who had lost her left eye and her palate to cancer. Ms. Piff described her experiences in a book, also entitled *Let's Face It.*

A doctor-friend of Mrs. Wilson visited a son in England, saw Ms. Piff on television, and bought her book for Mrs. Wilson to read.

"The book made me realize for the first time that I wanted to talk with others who had dealt with life after facial surgery," the Concord resident said.

The distress of facial disfigurement to the persons involved and their loved ones is incalculable.

She later had an opportunity to travel to England, meet with Ms. Piff, and lay the groundwork for the American branch of *Let's Face It.* In addition to flourishing in Europe, the society already had participants in Australia, Canada, New Zealand, and South Africa.

When Mrs. Wilson sought advice from her MGH surgeon, Dr. John D. Constable, on how to set up such an organization, he offered to host a lunch bringing together prospective members. Dr. Constable continues an active role in the society, serving on its board of directors.

The MGH plastic surgeon and Associate Clinical Professor of Surgery at Harvard Medical School not only attends board meetings but also reviews from a medical point of view all of the society's literature. He also recommends ways of forging ties with other groups that help the facially deformed, such as an organization in Canada called *About Face* and one in Norfolk, Va., which calls itself, *The Same on the Inside.*

An MGH psychiatrist, Dr. Norman R. Bernstein, serves on the advisory board of *Let's Face It.* He and Dr. Constable have collaborated on a number of scientific papers dealing with facial disfigurement, particularly from burns. Dr. Bernstein also authored a book, *Emotional Care of the Facially Burned and Disfigured,* published in 1979.

Can such patients benefit from psychiatric intervention? Dr. Bernstein, who is also Visiting Professor of Psychiatry at Harvard Medical School, said that many of the patients are convinced that one can only help oneself or that only a facially damaged person can really understand the plight of someone else in similar straits. But many others in the disfigured population feel that psychotherapy and other counseling can be quite useful.

Mrs. Wilson cited her own experience. College-trained as a child development specialist, she was offered a job a year after her surgery teaching four-year-olds in nursery school.

"I went to a social worker for the public schools in Concord and told her, 'I don't

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Children with facial deformities often become less self-conscious by playing with stuffed animals especially created with similar disfigurements.

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Facial Flaws Arouse Curiosity in Children

(Concluded from Page 7)

want these children to have nightmares as a result of having a teacher with this face.' I had not yet undergone a jaw transplant.

"The social worker told me, 'Betsy, facial disfigurement is way down in the list of things that frighten young children. It's the children who don't notice your face, who lack the natural curiosity, that we worry about.'"

Mrs. Wilson said that when a child asked her about herself she would say that she had been very sick. This is how the doctors helped her to get better. And she would emphasize that she does not hurt.

She added that on the street or in a supermarket it was not the child who stared who had a hard time but the child's parents. "They don't think their son or daughter should stare or ask questions," she said. "I see their questions, however, as a part of their beauty, or naturalness."

This was not an attitude that came automatically. It had to be learned. After undergoing her surgery in 1972, Mrs. Wilson appeared in public for the first time a month later by going to a tennis tournament.

"A boy really stared at me as I left the stadium," she said. "I responded by making a face at him and a noise as if I were crazy. I only did that once, though. I felt so embarrassed later because I realized that the stares were just expressions of concern and not mocking gestures. Now, when someone stares at me, I just smile and say hello."

For people facing a long readjustment after surgery, *Let's Face It* provides what it describes as "Resources for Recovery." These include a listing and description of organizations dedicated to assisting the facially handicapped, humor-filled and educational films and videotapes, some by children who have physical infirmities, and a variety of books.

One particularly well-received publication is called *The Non-Chew Cookbook.* Since many such postsurgical patients must endure a wiring together of the jaw for anywhere from six weeks to six months, the cookbook serves as a much needed resource in enabling them to develop and maintain a proper diet.

Through these and other activities, *Let's Face It* (P.O. Box 711, Concord, MA 01742) hopes to bring out of seclusion as many of the nation's facially disfigured as possible and to create branches where such people can converge and meet with role models.

A letter Mrs. Wilson received a few months ago from a woman in Albuquerque, NM, underscores the potential of such a plan. The woman wrote that she has a facial disfigurement caused by a congenital, nonmalignant tumor called a neurofibroma (*MGH News,* October 1980).

"I have felt somewhat isolated from the rest of humanity most of my life," she wrote, although she added that she tries not to let her face stop her from doing anything or going anywhere.

"Even though my doctor said there were others like me right here in Albuquerque, I never saw them," she said. "I assume they probably never show their face to the world."

After hearing about *Let's Face It* and its goals, including the formation of mutual-help groups, the woman wrote that she has been so excited about the idea she can hardly think of anything else.

"When one talks to someone who has experienced the same kind of physical difficulties," Mrs. Wilson said, "one is encouraged to realize that things are not going to be bad all of the time. Life does go on, and one's sense of humor does return."■

Betsy Wilson of Concord, Mass., a former cancer patient, who founded and directs the American branch of a mutual-help group called "Let's Face It"

MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 4 May 1988

New Program Helps Children to Overcome Obesity

In the past 15 or 20 years, obesity among American children has soared by some 40 percent. Although many youngsters simply overeat and underexercise, it often takes deeper digging to get at the root of a weight problem.

Consider the 11-year-old son of a baker who developed a habit of bringing home unsold pastries each day. As the boy consumed many of the treats, his weight shot up.

His mother became so worried she sought professional help. The son turned out to have a low metabolic requirement; that is, he did not need many calories. He could consume only 1,200 calories a day and still gain weight.

When the youngster was asked to eliminate the extras, he responded by becoming depressed and gaining still more.

"We were unaware at the time that the pastries actually provided the only communication between the father and the son," said Dr. Robert H. Wharton, an MGH pediatrician. "Unwittingly, we were interfering with the family relationship.

"We invited the father in, explained our concerns about his son, and worked out an arrangement whereby they could develop mutual interests in things other than food."

Since last July, Dr. Wharton has directed a newly established Weight Control Program in the MGH's Pediatric Ambulatory Care Clinic. Patients are seen on Tuesday mornings in the clinic (726-2728).

Dr. Wharton, who is also Director of Pediatrics at the MGH-affiliated Spaulding Rehabilitation Hospital, said most of the children enrolled in the Weight Control Program are older than 7 or 8 years of age, but some as young as 1 year are

(Continued on Page 2)

Mt. McKinley where researchers are studying the effects of low oxygen on mountaineers. Arrow denotes site chosen for researchers' camp at nearly 15,000-foot altitude.

Team Studies Brain Activity of Climbers

Eight researchers led by an MGH Senior Resident in Neurosurgery are camped high on North America's tallest mountain to study how exposure to low levels of oxygen can affect human brain function.

"When oxygen is inadequate, the brain undergoes many subtle changes," said Dr. Allan J. Hamilton before leading his team to Alaska's 20,320-foot Mt. McKinley. "Without more oxygen or time to acclimate to the new atmospheric conditions, an oxygen-deprived brain will begin to swell. If this process persists, coma will follow, then death." (See box.)

A principal goal of the expedition, funded by the Defense Department, is to test two highly sophisticated devices designed by Dr. Hamilton for measuring even the most minute changes in brain activity.

Up to now, physicians have relied heavily upon their personal observations of patients, a questioning of the patients to learn symptoms, and an array of tests that offered less-than-optimal results.

Dr. Hamilton and his research team have devised two systems that operate independently of any observer and provide noninvasive, computerized measurements of specific central nervous system functions.

In this way, a physician not only can detect a brain problem right away but through a series of tests given over time

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EDITORIAL:

In the Eyes of the Possessor

Humans are often sensitive to what should be minor matters. Perspiration, for example, staining a shirt. Or a raspy voice. In life's grand scheme these should be trivial. Perhaps there is a parallel in animal behavior that helps explain why they are not. A bird may have a melodious call, but if it varies significantly from that of its species, it will likely be unable to attract a mate. Markings or colorings in the animal kingdom similarly often affect the courtship chances of that animal.

With humans, similarly minor irregularities may make us self-conscious: facial scars, pimples, warts, and discoloration. Many people with such blemishes exaggerate their importance. The blemish may be more in the eyes of the possessor than the beholder. With permanent, remarkable facial marks, however, their presence may well play a role in a person's social life and prospects for marriage—though with humans the individual's personality and character will ultimately count for more with those who look deeper than the skin. That is why we often react more warmly as we get to know someone who first aroused negative feelings.

On Page 7 of this issue is an article about the use of lasers to destroy various kinds of birthmarks and other skin lesions. Many of these marks are destroyed by a particular laser called tunable dye. It was two MGH dermatologists whose basic research made possible the use of that device to destroy lesions. It was also at the MGH that the first successful patient uses of the tunable dye laser were carried out. Until then some types of blemishes were treated with another kind of laser that carried some risk of scarring. The tunable dye laser was designed specifically to reduce this risk.

Now the tunable dye laser has undergone several years of use in this way. Early results have held up well. The laser has continued to eliminate birthmarks, for example, without causing scarring. And even after those several years the first patients are delighted with their results. Though the initial problem was only skin deep, the people undoubtedly benefited psychologically as well as physically. An improved social life is a likely concomitant. Regardless of how small the marks were, their destruction has produced a major return.

Obesity in Children

(Continued from Page 1)

also referred for care.

"Generally our patients are significantly overweight," he said. "They range from 20 percent over normal body weight, which is defined as obesity, to double normal weight, which is considered morbidly obese.

"They come for a variety of reasons. Perhaps they no longer can get into clothing sizes suitable for others their age. Classmates may be calling them names because of their appearance. Or the family doctor may have diagnosed a medical problem, such as high blood pressure, which is a major risk factor for cardiovascular disease, especially in an obese individual."

Referral of 1-year-olds might follow a quadrupling of their weight since birth instead of the customary tripling. Overly rapid early growth calls for close monitoring. Since a child normally begins to walk at a year or a bit later, a physician would want to determine whether the increased activity slows the rate of weight gain.

Usually, baby fat means just that. As the child grows, the baby fat normally disappears. Dr. Wharton described severity and persistence as key factors associated with obesity.

"A child whose weight is 80 percent greater than normal is much more likely to become an obese adult," he said. "Also, the longer a child is obese, the more likely the condition will continue during adulthood."

All patients enrolled in the Weight Control Program are screened immediately for possible lipid, or fat, disorders. Nearly one of every five patients is found to have an above normal level of cholesterol.

Dr. Wharton not only organizes a careful medical history on a new patient to determine if some specific condition, such as a genetic malady, is causing the obesity but also works with the family, seeking further insights into the child's problem and how family members can best ensure compliance with a treatment regimen, typically including diet and exercise.

Photographs: Page 1, Bradford Washburn, Boston Museum of Science; pp. 3, 4, Myron Daniels; p. 5, courtesy of Dr. Allan Hamilton; pp. 7, 8, courtesy of Dr. R. William Gange
Drawing: Page 6, MGH Medical Art

"It is important to ask family members first of all how they feel about the patient's overweight status," he said. "They actually may not see weight as a problem. If the child has developed an illness such as high blood pressure, diabetes, or a heart condition, the family's cooperation in a treatment program becomes all the more vital.

Treatment for each youngster is tailored to that person's particular need. The diet of each overweight patient is studied in search of the easiest and most obvious ways to cut caloric consumption.

"We don't take foods away totally," the doctor said. "We just modify them or try to offer likable substitutions. Juice, for instance, contains as many calories as soda. One could dilute the juice. Instead of ice cream, ice milk or frozen juice bars might be preferable.

"For a child with diabetes, the diet would have to be more structured. Such children must have meals and snacks at certain times to coincide with their insulin requirements."

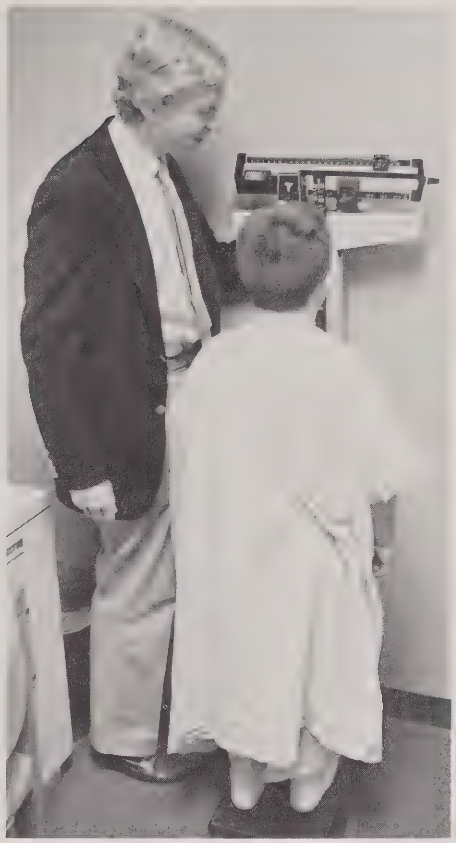
Families which keep a lot of candy and cookies in the home are asked to get rid of them. If a child needs something to munch, popcorn and crackers would be better fare.

Dr. Wharton encourages parents to have their children participate in the talks. The young patients regard the sessions as a family activity and like being a part of the decision-making process. The parents also express relief that they are not the ones whom their child will blame for cracking down.

Sometimes although a child has become obese, the primary problem upon which treatment must focus is not overeating but another habit.

Dr. Wharton, who is also an Instructor in Pediatrics at Harvard Medical School, told of a 16-year-old boy who was referred by a teacher. The teen-ager ate normal meals but drank too much.

"The patient drank tremendous amounts of beer," the doctor said. "He was oblivious to the amount of calories he took in, and his weight on his six-foot frame rose to 250 pounds.



Dr. Robert Wharton with a patient enrolled in the Weight Control Program

"Our treatment did not concentrate on his weight but on his drinking. We finally got him to cut down to only an occasional drink. That helped him to shed about 70 pounds."

Dr. Wharton, who formerly directed a Weight Control Program at The Children's Hospital in Boston, described obesity as not just one disorder but as a common pathway for different problems.

In particular, he welcomed recent reports by researchers indicating that many young people become overweight because – like the baker's son earlier in this article – their bodies handle food differently. The studies suggest that a tendency to gain weight often results from an inherited low metabolism, the process whereby food converts into energy. When the body burns calories slowly, food that is not needed for energy is stored as fat.

"This is what mothers and fathers have been telling physicians for years," Dr. Wharton said. "Parents of overweight children have been told, 'You must be stuffing your kids,' but the parents have been insisting that their youngsters don't eat that much more than their peers."

The importance of the latest studies, he said, is that the researchers looked into the metabolic rate of children before they added pounds and then waited to see if they would become obese.

Does this mean children with a low metabolism are destined to become overweight no matter what?

"We don't want these studies to make people fatalistic," Dr. Wharton said. "What physicians must do is use this information to study families more closely. Very careful histories should be taken to try to determine who has a greater potential to be overweight. We can then move early to deal with an expected problem. The most successful treatment for obesity is prevention."

Sometimes Dr. Wharton sees a patient for whom the best treatment is no treatment at all.

A 9-year-old champion ice skater was referred by her coach who felt the girl weighed about 15 pounds too much. By checking her triceps' skin folds the doctor decided her problem was not increased fat but increased muscle.

"She probably looked a little stocky," he said, "but she wasn't. Since being well-muscled would be helpful in her career, we didn't want to change that. Besides, she was at an age when her body was just developing. We told the young skater that she looked fine and tried not to make weight the issue."■

Brain Studies

(Continued from Page 1)

can also determine whether a patient's condition is improving or deteriorating, as well as whether one prescribed drug is better than another.

In addition to being a fifth-year neurosurgical Resident at the MGH, Dr. Hamilton is a Captain in the U.S. Army Reserve. An 18-month stint at the U.S. Army's Research Institute of Environmental Medicine in Natick, Mass., was built into his medical training. His army studies of the effects of low oxygen at high altitudes mirrored his interests in lack of oxygen (hypoxia) encountered frequently in patients in civilian life.

Last summer, Dr. Hamilton and fellow researchers spent a month atop 14,110-foot Pike's Peak in Colorado conducting preliminary studies for the McKinley work. Members of the army field laboratory on Pike's Peak were first tested as they arrived for duty on the mountain and then while their bodies adjusted to the changed oxygen levels over four weeks.

Extensive testing was also conducted in a hypobaric chamber at the army's Natick base. Conditions simulating an altitude of 15,000 feet and a temperature of 10 to 20 degrees below zero were created within the chamber.

Currently working with Dr. Hamilton at a camp established on the West But-

(Continued on Page 4)

Two Instruments Offer Vital Data In Brain Study

(Continued from Page 3)

tress of Mt. McKinley, nearly 15,000 feet above sea level, are three other soldiers from the Army, a member of the Marine Corps, two scientists from the University of Alaska in Anchorage, and a third civilian researcher from the U.S. Department of Defense.

The camp site is the only location on the mountain suitable for helicopter landings. In return for permission from the National Park Service to set up its research station, the team will also provide emergency first aid and rescue support during the expected five-week McKinley stay.

"Our work was planned to coincide with the climbing season on McKinley, even though the temperature can still plunge to minus 40 degrees," Dr. Hamilton said. "We plan to intercept 100 to 200 climbers on the mountain and invite participation in our noninvasive brain studies."

Plans called for examining 30 climbers in Anchorage prior to their McKinley ascent in order to record both pre- and post-climbing test data.

Taking the tests is simple. One machine is called an "upper extremity movement analyzer." A subject picks up a pen stylus and tries to draw a perfectly straight line between two points on an electronic grid. In less than a second, a computer analyzes how fast the arm movement was, how much wavering took place, how quickly the subject was able to slow down, etc. From such data, one can tell how the spinal cord and the cortex of the brain are functioning.

To determine the machine's sensitivity, Dr. Hamilton once tested himself before and after taking two drinks to see if the instrument would note a difference in his upper extremity motor function. It did.

The other instrument is called a "posturography analyzer." A person stands in a deliberately unstable position (with one foot in front of the other) on a force plate, resembling a large floor scale. A computer is hooked up to the plate, which is so sensitive it can weigh a postage stamp, and analyzes changes in the subject's center of gravity.

"To the naked eye, the person on the force plate may appear to be stationary," Dr. Hamilton said, "but there is no way a person can stand without moving some muscles for balancing purposes. The analyzer measures whatever instability is present by tracing the path of the subject's center of gravity."

The two machines complement each other perfectly. Dr. Hamilton said they appear to have much potential both in enabling the military to better protect its service people at high altitudes and in im-

In preparation for their McKinley trip, researchers were exposed in a hypobaric chamber to climatic conditions similar to those on the mountain. Photo shows Dr. Allan Hamilton within the chamber stowing gear in a tent especially designed to withstand severe weather.

Staff Sergeant Michael Walthers mans the controls of the hypobaric chamber at the U.S. Army's Research Institute of Environmental Medicine in Natick, Mass.

Why the Brain Swells

Swelling of the brain at high, oxygen-depleted altitudes results from a disruption of two essential processes in the brain.

First, a lack of oxygen leads to a failure of cellular pumps to maintain the environment needed to fire electricity through nerves. As the pumps run down, the cells swell and with the increased compression no longer work properly.

Second, cells that line cerebral vessels and maintain what is known as the "blood brain barrier" malfunction and, like a leaking dam, allow fluids to escape into the brain from the body's general circulation. The brain, confined in the skull, cannot tolerate much change in volume.

Sundowning: A Nighttime Form of Delirium

After calming an elderly patient who had become disoriented, restless, and upset, a physician noted in the man's hospital record:

"I had found Mr. Jones agitated, consistent with sundowning."

Sundowning?

The lay public may be unfamiliar with this term, but doctors have been aware of the condition for many years. Virtually every physician encounters a patient at one time or another who can be described as having the Sundown syndrome.

Since it can stem from any one of a host of primary causes and thus be very nonspecific, the syndrome may not be cited in a formal diagnostic report. Nevertheless, the major feature of sundowning is so unusual that the condition deserves special mention.

Sundowning refers to changes after nightfall in the demeanor of certain patients, usually of advanced years, whose ill health for one reason or another includes an underlying state of confusion.

Although quite stable in behavior during the daytime, such patients may suddenly act up at night, rattling bed rails, screaming at imaginary objects, talking back to a TV, or running down a corridor. The next morning, the patients once again appear calm and manageable. They usually do not remember what happened only hours earlier.

Dr. Allan H. Ropper, an MGH neurologist and Codirector of the hospital's Neurological Intensive Care Unit, said that sundowning may be a subtle form of what sometimes occurs when a severely demented, or deranged, person who functions well at home is brought into the very rigid, structured, and unfamiliar environment of a hospital or extended care facility.

"The demented patient is familiar with the layout of the rooms at home and the visiting routine of friends and relatives," Dr. Ropper said. "He knows when his meals will be ready . . . and may even be able to prepare them himself.

"Suddenly, he is in new surroundings. The meals arrive at different times. The bathroom is in a different place. There are unfamiliar faces. With the loss of his customary environment, he just decompensates. He may become totally disoriented and misbehave at any time of the day or night."

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proving the care of those afflicted with diseases of the nervous system.

After the McKinley trip, Dr. Hamilton and his colleagues hope to develop new software for the upper extremity movement analyzer and to begin testing patients with movement disorders in the fall.

With regard to the military's interest, the doctor pointed out that in continuing mountain hostilities between troops of India and Pakistan, some 1,000 men have died mainly from high altitude sickness. The soldiers became sick at heights that helicopters could not reach to bring them down. Thus stranded, the men developed brain swelling and eventually succumbed.

Specialist Fourth Class David Zahn takes a test with the upper extremity movement analyzer.

If rescue had come at an earlier stage, the brain could have restored itself over time. Oxygen, steroids, diuretics—agents needed to draw fluids out of the brain and to maintain membrane integrity—are used not only to treat mountain sickness but also brain swelling in patients with traumas or tumors.

Just as some people are endowed, however, with extraordinary talents in sports that demand speed, agility, or power, some individuals have particularly resilient breathing capabilities.

"They're lucky enough to have their brain instruct their respiratory system to breathe more efficiently when necessary," Dr. Hamilton said. "We think such people are less susceptible to mountain sickness. *People who have gained world notice because of their climbing exploits may actually be among those genetically endowed to be 'high altitude animals.'*"

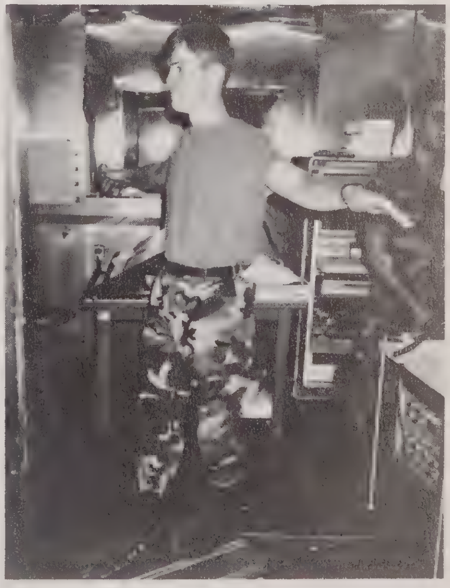
When one considers populations known to have inhabited the Andes in South America and the Himalayas in south-central Asia over 50,000 years, it is easy to believe that a lot of genetic adjustment took place to make these people better adapted to the high elevations.

Speaking of the civilian applications of the technology he and his team are testing, Dr. Hamilton pointed out that many diseases affect brain function.

"Multiple sclerosis is notorious for waxing and waning," he said. "It has therefore been very difficult to decide whether a prescribed treatment for that disorder is working. Now it is possible to measure what is happening and at a later time remeasure key factors to assess any changes.

"A person who has suffered a stroke often has poor timing and poor arm function. How well is the patient's rehabilitation coming along? Is past function coming back? The upper extremity movement analyzer permits one to follow a progressive picture."

With the force platform, one is looking at issues involving balance. Diabetes and alcoholism are both notorious for disrupting nervous system feedback, such as feeling from the bottom of the feet. Parkinson's disease patients have tremendous instability. Are treatments for any of these disorders helping? The posturography analyzer may supply the answer. ■



Specialist Zahn stands on the posturography analyzer to have changes in his balance measured.

Sundowning Typically Affects Older People

(Continued from Page 5)

In sundowning, darkness coupled with fewer visual cues, such as doctors, nurses, and technicians going about their busy routines, may be sufficient to cause agitation, belligerence, and even paranoia, characterized by delusions of persecution or grandeur.

Sundowners frequently have some degree of dementia or other form of generalized brain disorder. Many suffer from chronic alcoholism. But their return to a more stable demeanor during the day sets them apart from other mentally disturbed patients.

Dr. Ropper, who is also Associate Professor of Neurology at Harvard Medical School, recalled his residency training some years ago at San Francisco General Hospital when very large, gymnasium-like rooms served as wards, each accommodating up to 50 patients.

"About half of the patients had an alcohol-related disease," he said. "At night, when the sundowning began, many of the patients required restraints, either physically or pharmacologically. Sometimes the screaming or utterances of a few confused patients made others confused and led to bedlam. The San Francisco General no longer has those big wards."

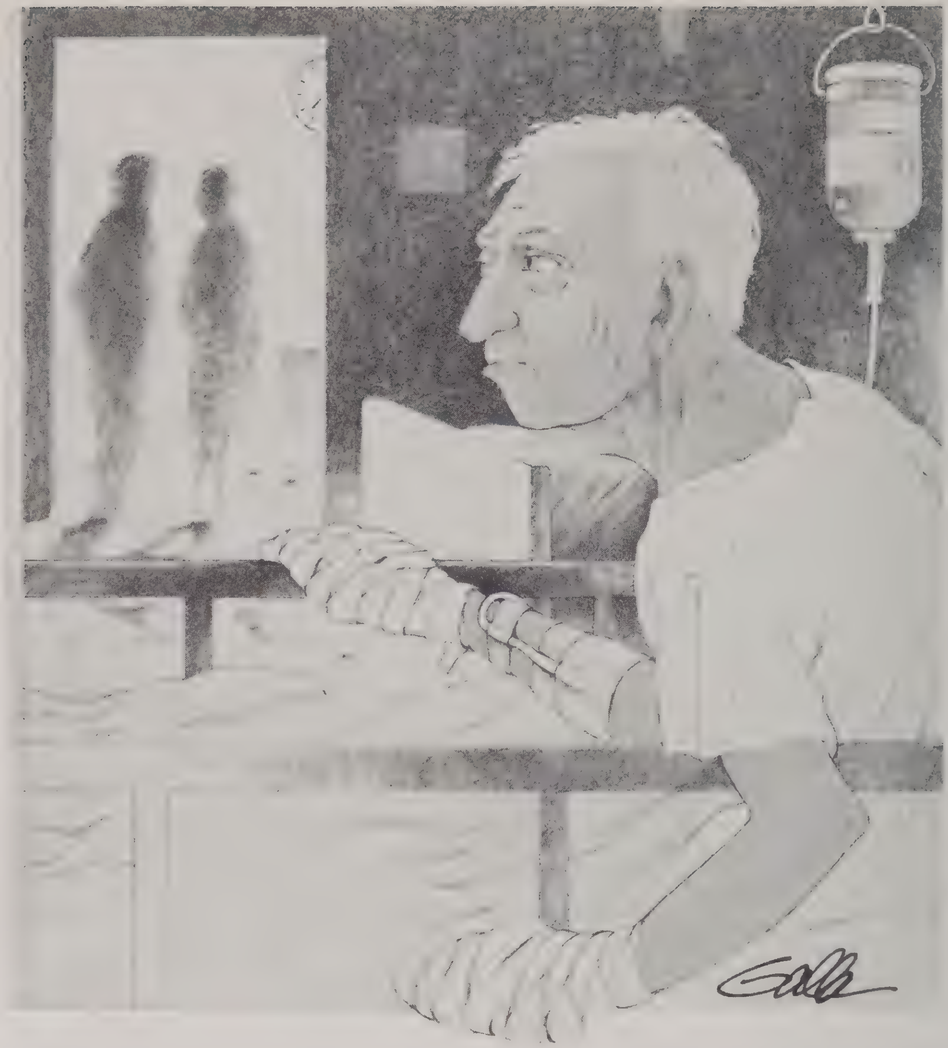
An MGH psychiatrist who sees a number of patients with Sundown syndrome uses the term delirium as an alternative label for the phenomenon.

"I think delirium is more accurate," said Dr. Theodore A. Stern. "Delirium typically fluctuates over the course of hours and days. One moment the patient is cognitively intact. A little while later he may think he's in a canning factory instead of a hospital. People can develop different views at various times about how well a patient's brain is functioning."

Typically, he said, sundowners are in their 70s or 80s. A young person who experiences the same symptoms would be considered as having delirium instead of the Sundown syndrome although the treatment would be similar.

Dr. Stern also said that in his experience many people with Sundown syndrome get that way not only because of a strange environment but also because they are physically sick and have complications from medications.

A patient admitted with coronary artery disease, for instance, may be put on a medication that lowers blood pressure to what would be a normal level for most people. For him, however, the pressure is reduced well below what his brain and cardiovascular system are used to. That can lead to delirium.



Sundowners are confused by shadows and unfamiliar faces at night. The wrappings on the patient's hands prevent him from removing his intravenous tubes while agitated.

Also in the cardiac patient population, individuals with electrical malfunctions of the heart which trigger irregular or abnormally fast heartbeats (arrhythmias) are put on drugs to control the pacing, but if somebody gets more medication than his body can tolerate, that person will become increasingly disoriented.

During treatment, people with chronic obstructive lung disease causing lack of oxygen (hypoxia) may suffer intermittent blockages due to mucus. Since the brains of older people tend to need more time to recover from the effects of the hypoxia, these individuals are likely to become temporarily more agitated and confused.

A commonly prescribed antacid used to prevent gastric ulceration can lead to disorientation and delusions. Its histamine-blocking action affects not only the gastrointestinal tract but also the brain.

"Sometimes, one cannot find the cause of a patient's delirium," said Dr. Stern, who is also Director of the MGH's Resident Psychiatric Consultation Service and Assistant Professor of Psychiatry at Harvard Medical School. "You may have a situation where the whole is greater than the sum of its parts.

"Somebody's sodium may become a little low, also the oxygen in his blood. And he may be receiving an antiarrhythmic drug. All of these things together may lead to a state of delirium when only one of the conditions may not."

Dr. Stern estimated that 15 to 20 percent of postcardiac surgical patients and patients in medical intensive care units experience some delirium.

"That doesn't mean we get to see all of those people," he said. "Surgeons, cardiologists, house officers, and Fellows of various specialties have run into this problem so commonly they know how to treat it.

Increased Use of Lasers Expands Unit

An MGH laser unit dedicated to the eradication of unsightly skin blemishes is observing its second anniversary this month by planning to move shortly into much more spacious quarters.

Situated in the Dermatology Ambulatory Center, the unit presently has up to a three-month waiting list for patient care employing either a tunable dye laser or a carbon dioxide (CO_2) laser.

The decision to expand laser service within the center stems in large part from successes of the high-energy instruments in overcoming more skin problems than were addressed two years ago.

The dye laser attacks abnormal blood vessels in the skin without affecting surrounding tissue. This is accomplished by setting the laser to a wavelength of light that is absorbed only by the hemoglobin of blood. The light beam shines on the target for such a brief fraction of a second that even if the temperature within a vessel reaches 100 degrees, the heat turns off before it can spread from the target.

In contrast to the dye laser, the CO_2 laser is used to cut away or vaporize abnormal skin tissue which may be cosmetically unacceptable.

Until last January, laser treatment sessions were held on Monday morning and Wednesday afternoon of each week. Then a Thursday morning session was added. The goal is to schedule five half days per week in the new treatment facility.

The laser spotlight continues to focus most often on erasing birthmarks known as port-wine stains (hemangiomas) which affect some 55,000 Americans (*MGH News,* May 1986).

The tunable dye laser used to treat the purplish-looking, abnormal formations of blood vessels was developed in the MGH's Wellman Laboratories of Photomedicine, directed by Dr. John A. Parrish, Chief of Dermatology.

"Having amassed considerable experience with the tunable dye laser, we are now using it on areas of the body once thought to be more difficult to treat," said Dr. Ernesto Gonzalez, who collaborates with Drs. R. William Gange and Khosrow Momtaz in the unit.

"Where we used to concentrate on the face, we're now working with the tunable on just about every part of the body and getting good results."

Although much of the birthmark may gain a normal skin color, little areas or "islands" in the lesion usually will have some residual discoloration.

The number of needed treatments varies from one to six according to the location of the lesion and its size. On the face, for example, the nose and the areas around the eyes are particularly sensitive and require a more cautious approach.

Dr. Gange said that sometimes the laser treatment will lead to only a 50 percent lightening of a birthmark, but the patient nevertheless will often be very gratified.

"That's partly because the patient will see himself as looking better than before, and he also will find it easier cosmetically to conceal the mark that remains," Dr. Gange said.

Dr. Momtaz said it is unclear why in one patient a birthmark will vanish with treatment while in another person only a partial lightening results.

"We've been obtaining skin biopsies [snippets of tissue for laboratory study] from such patients," he said, "to try to learn what might cause a difference in the response."

The MGH laser unit has obtained dramatic results in use of the CO_2 to cure patients of a nose enlargement called rhinophyma. Sometimes described as looking like an alcoholic's nose, the condition occasionally befalls men (rarely women) who are first stricken with rosacea, a common, adult form of acne.

Rosacea may erupt on the cheeks, the center of the forehead, or the nose. When the nose is affected, its oil glands may be-

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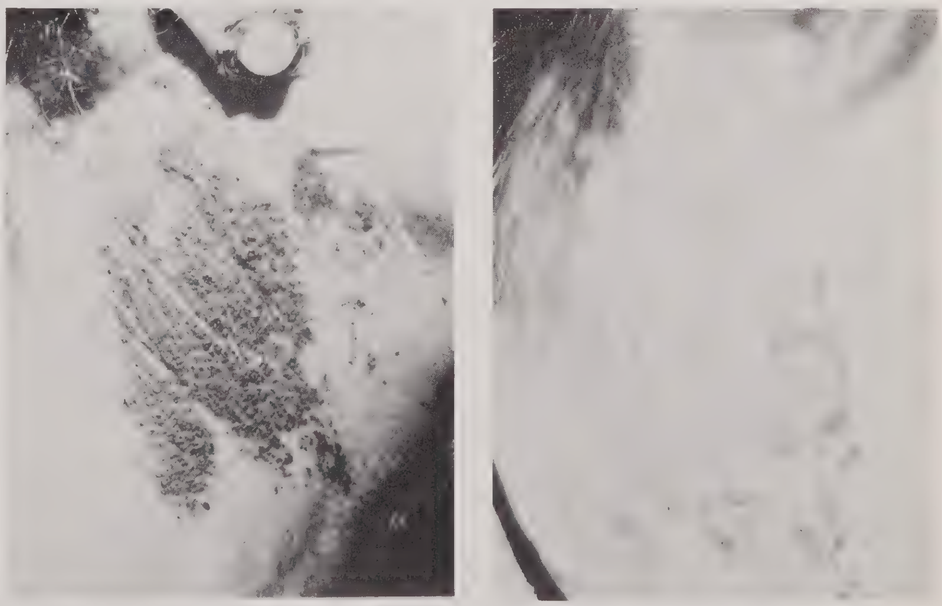

After enduring a prominent birthmark on her neck for 67 years, this woman was able to have much of it removed by a tunable dye laser in two treatments.

"We in psychiatry tend to get the more difficult patients, those who may be considered more dangerous to themselves and possibly others."

Dr. Stern said that to calm confused and upset patients he and his colleagues first try to explain to them where they are and what is going on.

The doctors may also order appropriate lighting installed in the patients' rooms to avoid harsh shadows that might lead to a misinterpretation of visual stimuli. Calendars are pinned up to help orient the patients. And when shifts change, staff people coming on duty are urged when necessary to make clear who they are and what their roles are.

Sometimes, drugs such as haloperidol are used to help minimize patient hallucinations and clear their thinking.

"We use haloperidol much more often than a cousin of it called Thorazine," Dr. Stern said. "Thorazine tends to be more sedating, particularly among older patients. After taking that drug, they might get dizzy on standing up and fall."

More and more sundowning is being detected as America's patient population ages. But Dr. Stern said the expression Sundown syndrome is becoming outdated.

"By calling it more appropriately 'delirium' or 'delirium-complicating dementia,'" he said, "the way is opened to investigate possible causes and proposed new treatments. Sundowning makes one think that 'the patient is just an old person with poor brain function who gets confused at night, and what can you expect anyway.'"■

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Many Skin Conditions Respond to Lasers

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come very swollen, giving the nose a red, bulbous, and corrugated-looking appearance.

After administering a local anesthetic, the MGH dermatologist can literally prune the nose down to normal size by using the laser to remove one layer of skin after another.

Dr. Gonzalez said that laser treatments given to rhinophyma patients in the unit were completed in a single, hour-long visit in each case.

"Although the procedure can leave scarring," he said, "this has not resulted in a problem in any of the patients we have treated."

Electrocoagulation, the use of a heated wire loop as a cutting instrument, is another method of treating rhinophyma patients. The loop prevents excessive bleeding by cauterizing as it cuts.

In the Dermatology Ambulatory Center, rhinophyma patients are treated with either the CO_2 laser or electrocoagulation since each can produce very good results. Dr. Jessica L. Fewkes performs the electrocoagulation procedure. The results of each technique are under study in an effort to determine which method is better.

Some types of raised, roughened areas of skin, often present at birth, also yield to the power of the CO_2.

Dr. Gange said that these lesions, called epidermal nevi, often have a linear distribution on the trunk of the body or down a limb. Although they may be skin-colored, they can cause discomfort when clothing rubs them.

"By vaporizing them," Dr. Gange said, "the skin underneath can heal with a very thin, supple scar. Sometimes that is cosmetically much more acceptable than something which is raised and scaly."

The CO_2 laser has been used for a long time to dispose of warts and more recently has been shown to be effective against another condition related to wart virus infections.

The condition is called "bowenoid papulosis." To the eye the lesions look like genital warts and are probably caused by the wart virus, but under a microscope they resemble a nonspreading form of cancer (squamous cell carcinoma).

Dr. Gonzalez said that "we have had very good results with the CO_2 laser, even in patients who have been resistant to other forms of treatment."

The doctor added that evidence has been gathered showing a particular strain of wart virus is present in carcinoma of the cervix.

"It may be," he said, "that the virus first becomes dormant in the cells and then later expresses itself as a cancer. Gynecologists use the CO_2 laser to treat that problem."

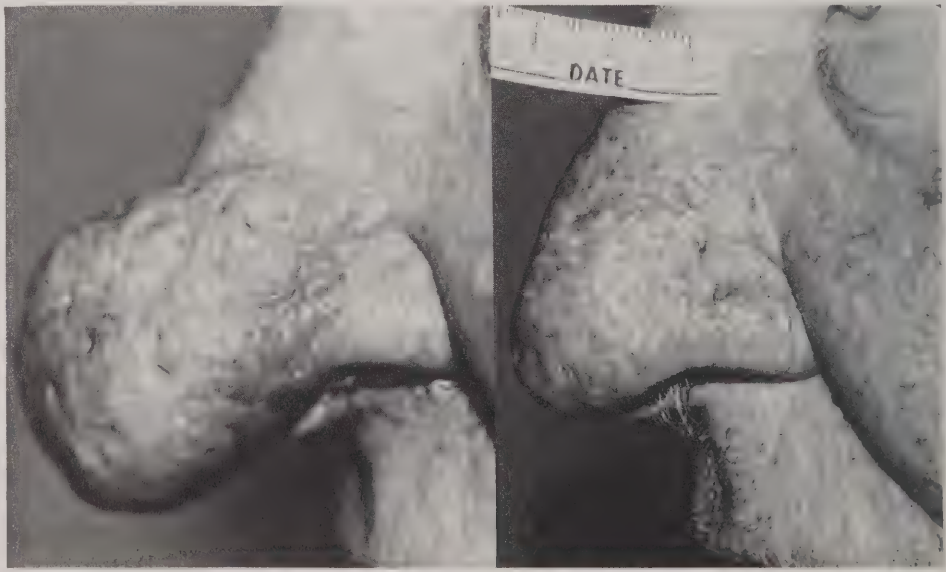
On occasion, someone seeking removal of a tattoo visits the laser unit. Dr. Momtaz said that because the area tattooed is often large, treatment even with the CO_2 sometimes leaves unsightly scarring.

"The scar looks like a burn scar," he said, "and in some body areas, especially the shoulders or chest, it may develop a thickened, lumpy appearance."

He said compressive wound care as a follow-up to laser treatment appears to improve the results. A pressure bandage placed on the treated area and kept there for three months helps to prevent thickened scarring.

A couple of years ago, most skin problems treated with either the tunable dye laser or the carbon dioxide laser were not insured by third-party payers. As a result of advances made since then in laser technology and applications, insurers now pay for laser treatments of most skin conditions.

Tattoo removal, however, is not among these. ■



His nose enlarged by swollen oil glands, this patient turned to a CO_2 laser to restore his normal appearance.

MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 5 June–August 1988

New Unit Acts to Diminish Pain in Cancer Patients

A year ago, Melvin Fisher of Newton, Mass., feared he was losing his grip on life.

Beset with complex immune system disorders that affected his blood, the 60-year-old retired oil company executive suffered episodes of chronic pain that at times were unbearable.

He found walking difficult, even with special shoes, and whenever he tried to undertake a project with his hands, sharp pain radiated through his fingers.

"I tried not to give in to anything," he said. "I handled most of my pain problems by taking a lot of prescribed medicines."

During one difficult period, Mr. Fisher received daily injections of morphine and took a second narcotic every two hours. He also wore a portable pump from which a tube entered his chest to deliver a third pain reliever around the clock.

He said he was on so much medication that he often walked about feeling almost comatose.

"I remember receiving several shots of morphine over a short period in the MGH Emergency Ward," he said. "The shots failed to stop my pain and were followed by an almost week-long hospitalization. I thought to myself, 'I can't go on like this. How many more shots will I need the next time? If I can't handle things now, how can I expect to function during the rest of my life?'"

A turning point came in May 1987. Mr. Fisher sought help from Dr. Raymond J. Maciewicz, an MGH neurologist. He not only offered the patient ways of obtaining pain relief but also saw an opportunity to attack the pain of cancer by organizing a multispecialty Cancer Pain Center (CPC) in the Cox Building, a part of the MGH Cancer Center.

(Continued on Page 2)

House Calls to Treat Abnormal Anxieties

Anxiety is a normal part of living, helping a person to be more alert, more prepared, and more attentive to responsibilities.

An extreme and maladaptive form of anxiety, however, is a panic attack.

In the face of danger, an alarm response or panic may be normal. As with a surge of adrenalin, panic quickens the heart rate, respiration, and flow of blood to major muscles for a "fight-or-flight" survival response.

But what if attacks of panic occur without any danger being present or imminent? As many as six of every 100 adult Americans suffer such recurrent unexplainable attacks. To compound the problem, many of these people go on to shun places where they think a panic attack might recur and where help might be inaccessible. This could be a supermarket, restaurant, airplane, or elevator–places of restricted escape and at a distance from home.

This complication of panic is called agoraphobia. Although in Greek the word means "fear of the marketplace," psychiatrists at the MGH favor the more general term of "phobic avoidance" as a description of this disorder.

Certain drugs can turn off the false alarm of panic attacks, permitting rapid recovery from agoraphobia in many cases, but some people so fear the possibility of an attack they literally shut themselves up in their homes and feel unable to seek medical care.

To reach this hidden population, of unknown size, the Clinical Psychopharmacology Unit (CPU) at the MGH has inaugurated Project Homebound. It features house calls by psychiatrists.

The patient learns of Project Homebound through the media or other sources, contacts the MGH unit to enroll, and is screened once by mail and then by telephone. If the individual seems to meet necessary criteria, the doctor makes a home visit for a personal evaluation. The visiting area at present is limited to Boston and its suburbs.

"We are looking for people who are essentially completely homebound," said Dr. John B. Herman, Director of the MGH project. "If they were homebound in the past but are able to leave home now, to hold a job, for example, they are

(Continued on Page 4)

Many agoraphobics shun an often crowded subway because of fear of having a panic attack.

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EDITORIAL:

Fireworks—An Awe-Inspiring Hazard

Fireworks enjoy an ancient history dating to the Chinese. There is something about pyrotechnical displays that evokes an almost primitive excitement in adults as well as in children. In some countries in fact their use carries a religious component. In Chichicastenango, Guatemala, for example, Mayan Indians have traditionally fired rockets from the steps of the main church during the celebration of the St. Tomas holidays. It is said they use copal incense there to reach God with their smoke and employ rockets to streak to the heavens that much faster.

Even without a religious component, the sight of a rocket shimmering skyward, bursting into brilliant colors and designs while exploding in a thundering boom inspires awe in the manner of lightning and thunder.

Often, though, even as it entertains, nature extracts a price. With lightning it may be the electrocution of humans or damage to property. And with fireworks, man's imitation of nature, it may be lost sight or other maiming. This is too high a price. And that is why the federal government and most states regulate the sale of fireworks.

One of the problems is that state regulations tend to vary widely. It achieves little to have stringent regulations in one state if the neighboring one is liberal. In this automobile-ruled republic, even youngsters can wheel into the next state and purchase fireworks.

This is why new legislation passed by New Hampshire last month appears to have grave potential for contiguous states. As a Page 7 article in this issue describes, the law mandates that to buy certain fireworks in that state, the purchaser must have a permit signed by the local fire chief. There is, unfortunately, a major exception. Someone from a neighboring state needs no permit so long as the fireworks bought are transported out of New Hampshire within 24 hours. That is known as exporting trouble.

Women's Health Associates, a Renaissance

The expansion and refocus of the MGH Women's Health Associates is a welcome event. Born only two years ago, the newly invigorated practice avoids the stereotype of most other women's health services, which are essentially gynecology care centers. By contrast the MGH Associates blends several specialties: internal medicine, psychiatry, psychology, endocrinology, and gynecology. Another important attribute is the leadership of Dr. Isaac Schiff. As the new Chief of the MGH's Vincent Memorial Hospital, Dr. Schiff brings with him an outstanding reputation for both excellence and compassion. Along with the other outstanding members of the Associates and the codirector, Dr. Albert G. Mulley, an internist, it is in reliable hands.

Cancer Pain Center

(Continued from Page 1)

Dr. Maciewicz sent his patient to the nearby MGH-affiliated Spaulding Rehabilitation Hospital for four weeks to be weaned off his drugs and to learn how to deal with his tensions mainly through relaxation techniques and a variety of exercises.

"I look at life differently and with a clear head now," Mr. Fisher said. "I'm no longer overwhelmed with worry over how I'm going to cope tomorrow or next week or next year. Under Dr. Maciewicz's guidance, my whole focus has changed."

When pain returns, as it does occasionally, Dr. Maciewicz gives Mr. Fisher an injection that breaks the pain cycle, bringing relief for up to two weeks. The Food and Drug Administration has approved this new procedure on an investigational basis.

Mr. Fisher described the pain blocks as "my safety net," but said that "the quality of my life now is better than it's been in years." He makes regular visits to the CPC where his care can be managed effectively.

In organizing the CPC, Dr. Maciewicz emphasized that his group was not trying to replace the oncologist or a patient's primary physician but to seek relief for patients from pain associated with the cancer process—much like a cardiologist might be consulted if a cancer patient had concomitant heart disease.

"Forty to sixty percent of cancer patients have significant pain at some time during their illness," he said. "If one looks at patients who have metastatic [spreading] disease and perhaps only a few months to live, 85 to 90 percent will be found to have significant pain."

The CPC strives to determine the specific causes of pain and the best strategy for improving the function of the patient while minimizing the discomfort.

When the center encounters a patient taking a short-acting narcotic with a high potential for diversion and abuse, the center switches the individual to a longer acting, slow release morphine compound that seems to be a better painkiller and at the same time has much less potential for addiction and abuse.

Photographs: Page 8, courtesy of National Society to Prevent Blindness, Schaumburg, IL; others by Myron Daniels

Dr. David Borsook of the Cancer Pain Center performs a neurological test on a patient as the center's director, Dr. Raymond Maciewicz, looks on.

Dr. Maciewicz emphasized, however, that treating cancer pain is not simply a matter of handing out strong pain-relieving medication. He said that such drugs have their place, but the important thing is to evaluate the individual patient's needs in the context of several different specialties and to offer when appropriate not only medical treatment but also surgical and psychological interventions.

"We have a variety of innovative treatment plans for patients with different kinds of pain at different stages of their illness," Dr. Maciewicz said.

Drs. Joseph B. Martin, Chief of Neurology, and William C. Wood, Clinical Director of the MGH Cancer Center, helped to pave the way for establishment of the CPC. In addition to Dr. Maciewicz, its director, principal members of the pain service are Dr. David Borsook, a Fellow in Neurology; Dr. Gudarz Davar, a neurologist and psychiatrist; and Judith Spross, MS, RN, a clinical nurse specialist.

Others with important roles in evaluating and caring for patients with cancer pain include Dr. Fred H. Hochberg of neurology, Drs. William H. Sweet and Charles E. Poletti of neurosurgery, Dr. Donald P. Todd of anesthesia, Dr. Daniel B. Carr of anesthesia and endocrinology, Dr. Donna B. Greenberg of psychiatry, Joanne Lynn and Terry Hoskins-Michel of physical therapy, and Joanne Baggerly, RN, clinical nurse specialist.

Harold J. DeMonaco, Director of the MGH Pharmacy, assists the CPC team in evaluating complicated medications and formulating drug programs for pain patients.

Pain can result when cancer extends, or metastasizes, to bone or internal organs. And it can follow extensive surgery, such as a limb amputation, extraction of a lung, or removal of a breast and lymph nodes.

In addition, certain drugs used to treat cancer can create pain and abnormal sensations in peripheral nerves. Sometimes the condition is easily reversible; sometimes it is not, especially when the drug interacts with other medications.

"Patients with damage to the brachial plexus, the nerve which serves the arm, or the lumbar plexus, serving the leg, often end up with severe pain that does not respond well to conventional therapy," Dr. Maciewicz said.

"As many as 30 percent of the patients we see require complex evaluation and treatment."

The care may call for psychological intervention, a rehabilitation program, and social efforts tailored to the special needs of the individual. The therapy may not involve drugs at all.

The Cancer Pain Center maintains patient visiting hours on Tuesdays from 8:30 a.m. until noon and on Fridays from 1:30 p.m. to 4 p.m. Tel. (617) 726-8659.

Emergency consultations are possible around the clock. The clinical nurse specialists, who have had training in treating cancer, often answer patients' questions. Since some matters require contact with a physician, however, the nurses keep channels of communications open with the team's medical staff.

Although a significant impact can be made in managing pain associated with cancer in the large majority of patients, Dr. Maciewicz said there remains small groups in whom even major interventions end up failing.

"Certainly," he said, "further research into the basics of pain, as well as the psychological and social aspects of chronic disabling disease, will help us address the needs of these small groups."

In this regard, the MGH Cancer Center's research unit in the Charlestown section of Boston will soon open a multispecialty section for further basic studies into the mechanisms of pain.

"Hopefully, new understandings of ways in which pain develops and new avenues of treatment will be forthcoming," said Dr. Maciewicz who will head part of the research effort.

"The Cancer Pain Center looks forward to a close cooperation with the entire investigating team to bring innovations by the laboratories to the patient as soon as possible."■

Staff members of the Cancer Pain Center meet frequently to consult on patient care.

Helping Anxious Patients to End Seclusion

(Continued from Page 1)

not included in the project as they would be able to come in for treatment. They may be eligible, however, if once in a while they left the house just to visit a neighbor or walk around the block."

Dr. Herman said that during an initial home visit anyone meeting criteria for the program could start treatment.

"In the beginning, a member of the research team will check on the patient by phone twice a week," the doctor said. "We should know within days whether the treatment is having a positive effect.

"The psychiatrist will make one or more home visits before the first six weeks of treatment end. Then the patient is offered further care at the Clinical Psychopharmacology Unit. The ability to accomplish a hospital visit would be a sign that the individual has improved."

There is no expense to the patient for the home visits or for the initiation of medication treatment.

Dr. Herman and his colleagues will also be comparing the homebound patients with those who come to the CPU, looking at such factors as age, early history, life-style, course of illness, and treatment responses.

If medication treatment fails, a second kind of help will be available through introduction to self-help groups and adjunctive use of behavioral techniques.

The medication prescribed in Project Homebound is alprazolam (Xanax), a benzodiazepine-type of drug which offers both anti-anxiety and anti-panic effects.

The Food and Drug Administration approved alprazolam in 1982 for anxiety symptoms but recent multinational studies have established its efficacy in blocking panic attacks.

Alprazolam is free of many of the side effects of other panic stoppers. Dr. Herman said the pill's major problem is a sedating effect early in treatment but, he added, most people quickly acclimate to that.

"The drug has to be taken three or four times a day," the psychiatrist said. "We usually try to reduce the dosage after a period of months, but some people continue on the medication over time. We look at panic disorder and agoraphobia as a chronic problem in many cases, like hypertension or diabetes."

Dr. Herman, who is also an Instructor in Psychiatry at Harvard Medical School, told of a highly successful restaurateur who came to him four years ago:

Dr. John Herman of the MGH Psychopharmacology Unit makes a house call.

"He was the sickest person in terms of panic disorder and persisting anxiety who had ever come to my office. I asked him to sit down, but he couldn't. In fact, he repeatedly stepped out of the room. Physicians had told him that he was physically okay, but he felt in tremendous pain. He said his visit to me was a last straw. Unless he got help, he was going to kill himself.

"I started this patient on alprazolam, although other treatments could have also been selected, and he has not had a panic attack since. The symptoms do start to recur, however, when we attempt to reduce the drug's dosage. Although still on the medicine, the man, who is in his 40s, is happy and continues to run his successful business."

Agoraphobia—probably the most common phobic syndrome psychiatrists treat—usually strikes people between the ages of 18 and 35. *It has been said that the disorder rarely affects children, but a study of youngsters aged 2 to 7 just reported by an MGH–Harvard team questions this.*

In the report published last month in the Archives of General Psychiatry, Dr. Jerrold F. Rosenbaum, the prime author and Chief of the MGH's Clinical Psychopharmacology Unit, wrote:

"Behavioral inhibition to the unfamiliar . . . is highly prevalent in the offspring of adults in treatment for panic disorder with agoraphobia.

"These children appear to be at risk for distress and disability in childhood and also perhaps for development of psychiatric disorder in later childhood and adulthood."

In a report published in the Journal of Clinical Psychiatry, Dr. Joseph Biederman of the MGH Pediatric Psychopharmacology Unit, wrote of treating an 11-year-old girl whose mother had suffered from panic disorders and agoraphobia since adolescence.

When she was in the third grade, the daughter experienced an anxiety attack that so overwhelmed her she refused to go to school anymore. Whenever she left home, she needed her parents with her.

Dr. Biederman first treated the child with desipramine, then added clonaze-

Before enrolling anyone in Project Homebound, Dr. Herman will assess the candidate's eligibility.

MGH Expands Health Care for Women

Vincent Memorial Hospital, the MGH's Gynecological Division, has moved to accelerate delivery of health care to women and to open two new units.

More physicians and other personnel will be added to the division's clinic staff to shorten the wait to within a week for a nonemergency appointment with a gynecologist.

The expanded staff will also strengthen the division's ability to respond to consultation requests by physicians in other MGH departments.

The plans were announced to the *MGH News* by Dr. Isaac Schiff, who on April 1 became Vincent Memorial's Chief of Staff and MGH Chief of Gynecology. He succeeded Dr. George S. Richardson, who served as Acting Chief for three years.

Dr. Schiff also intends to establish two special units. One will serve women having menopausal problems, an area of medicine in which he has conducted pioneering research. The other unit will seek to assist infertile couples.

The expansion will get under way next month when Women's Health Associates (W.H.A.), a multidisciplinary practice of the MGH and Vincent Memorial, moves from present quarters in the hospital to an area five times larger at 60 Staniford Street, only two blocks away.

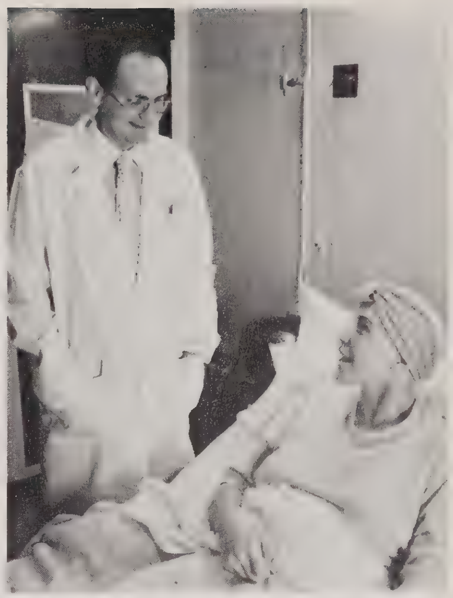
Codirected by Drs. Schiff and Albert G. Mulley, W.H.A. offers expertise in internal medicine, gynecology, endocrinology, psychiatry, and psychology in providing comprehensive care to women (*MGH News,* January–February 1986). The practice emphasizes preventive medicine and patient education, encouraging women to be partners with their physicians in health care.

The team's clinical head, Dr. Karen J. Carlson, said that three more internists will be added to the six already on the staff. With the larger quarters and staff, she said, W.H.A. will not only be able to shorten waiting times for appointments but also double its accommodation of patients from the present 4,000 annually.

Dr. Schiff emphasized that what is often a difficult experience for a woman should be made as easy as possible. In keeping with the long tradition of the Vincent Memorial Hospital, he said, a woman who comes for care should feel on leaving that she has been treated with dignity and respect in a warm setting and has received the most advanced care available.

In coming from the Brigham and Women's Hospital in Boston to take over the reins of gynecology at the MGH, Dr. Schiff also became Joe Vincent Meigs Professor of Gynecology at Harvard Medical School. He continues to hold staff privileges at the Brigham since, under a cooperative arrangement with the MGH, Residents in Obstetrics and Gynecology rotate in their training between the two hospitals.

Dr. Schiff was born and raised in Montreal and was graduated from McGill University as a University Scholar and from its medical school. Throughout his schooling, he pointed his future toward psychiatry.



Dr. Isaac Schiff chats with a patient in Vincent Memorial Hospital, the women's care division of the MGH.

"I had worked summers as a camp counselor," he said, "and frequently encountered children with emotional problems that led at times to deviant behavior. I always wondered why these children acted the way they did."

After earning his medical degree, Dr. Schiff realized that some psychiatric illnesses have roots in physical disorders and that to be a knowledgeable psychiatrist he needed to fine tune his understanding of medicine.

While fulfilling a medical residency at Montreal General Hospital, the young doctor became fascinated with the medical aspects of reproduction. This brought him to Boston for a residency in Obstetrics and Gynecology at the Boston Hospital for Women, later to become a part of what is now the Brigham and Women's Hospital.

In 1976, while at the Boston Hospital for Women, Dr. Schiff established what was probably the first Menopause Clinic in the nation.

"My motivation in starting the unit," he said, "was that in those days staff physicians and Residents were so busy with deliveries, therapeutic abortions, and other procedures, they had little time to devote to the menopausal problems of women in their early 50s. Thus, through the new unit we were able to provide better care for these women.

"Equally important was the fact that as we took care of them, if we ran into difficulties for which no solutions were known, we could embark on practical

(Concluded on Page 6)

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pam, the same drug her mother was taking. The girl's phobic-avoidant symptoms abated. She returned to school, adjusted well, and by junior high school was voted the most outgoing student in her class.

Agoraphobia affects people from all walks of life and social classes. Two thirds of the patients are women. The condition may follow a major upheaval in one's life or even some trivial event.

Since panic can be accompanied by palpitations and chest pains, a person with agoraphobia may fear a heart attack has occurred.

Many agoraphobics accept their plight stoically, as if there were no choice. They often try to white-knuckle their way through their anxiety.

They might hold a job but only travel to and from work, staying home the rest of the time.

Some agoraphobics enter feared situations but suffer considerable distress. If they attend the theater, for instance, they might take an aisle seat in case a panic attack causes a hurried exit.

Agoraphobics are not "loners." They usually stay close to their families and want company, a trusted companion who can lend psychological support.

"Sometimes the companionship of their own children is sufficient to provide a sense of security," Dr. Herman said.

The MGH psychiatrist said there is no question that the earlier that panic attacks and agoraphobia are resolved the less will be the effect of phobic avoidance behavior. People will eventually stop looking over their shoulder for another attack to occur. ■

Dr. Schiff Conducted Pioneering Research On Estrogen Activity

(Concluded from Page 5)

research to look for the answers."

This arrangement led Dr. Schiff to a discovery that estrogen, a female hormone taken by some women during menopause to prevent osteoporosis [a thinning of bone], can have a varied effect on the body depending on how the drug is administered.

"With the cooperation of women volunteers," he said, "we found that when estrogen is placed into the vagina, the hormone enters the bloodstream directly and faster than if it were taken orally.

"When administered by mouth, the estrogen is affected during passage through the liver. The drug becomes less potent and very much different from what the patient thought she had taken."

If a woman has a history of breast cancer or of some type of thromboembolic disease, such as clots in the lungs, estrogen replacement therapy during menopause is avoided for fear the disorder will recur. Yet, some of these women have sudden sensations of body warmth (hot flashes) due to a natural loss of estrogen during menopause.

Dr. Schiff and his colleagues found that a drug called medroxyprogesterone could eliminate hot flashes. He followed this work with a study of another drug, a nonhormone called Lofexidine, and demonstrated that this medication had a similar blocking action.

Shown in his laboratory, Dr. Schiff established in Boston what was probably the nation's first Menopause Clinic.

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GENERAL HOSP

In a more recent study, Dr. Schiff investigated the usefulness of skin patches containing estrogen and found that they were also effective in preventing or at least alleviating hot flashes.

Since some women complain of insomnia during menopause, Dr. Schiff and Dr. Quentin Regestein, Director of the Sleep Clinic at the Brigham and Women's Hospital, collaborated in a study to learn what effect estrogen supplements would have on these women. The researchers found that when given this hormone, the women fell asleep more quickly and enjoyed more of the helpful REM (rapid eye movement) or dream sleep.

Dr. Schiff plans to work closely with the Reproductive Endocrine Unit on fertility issues. In this photo, the unit's chief, Dr. William Crowley, left, confers in his laboratory with Alan Schneyer, Ph.D.

Dr. Schiff plans to continue his research on menopause while at the MGH. He intends to look further into the effects of estrogen on sleep behavior, as well as on heart disease and the general well-being of the aging woman. And he wants to find out what makes certain women at risk for osteoporosis. Why do some women have symptoms while others do not?

During late April, the MGH physician cochaired a two-day meeting in Bethesda, Md., on the latest developments in menopausal research. Twenty experts from throughout the world attended the sessions, sponsored by the National Institutes of Health.

Although his studies focus predominantly on menopause, Dr. Schiff is very much interested in the care of couples with problems of infertility and plans to collaborate closely with Dr. William F. Crowley, Jr., Chief of the Vincent Memorial's Reproductive Endocrine Unit.

"Infertile couples endure a very painful emotional experience," Dr. Schiff said. "Through the infertility unit that we are just starting, we want to do what we can to ease that pain. As technology on infertility advances, it may be possible to offer real hope."

Dr. Schiff and his wife, Jan, have two children, Julie, 13, who aspires to become a lawyer, and Daniel, 12, whose talent in art is guiding him toward a career in architecture.

Each Christmas season brings further pleasure to the doctor as he receives letters from former patients that include photos of children they once feared they would never have. ■

Misuse of Fireworks Can Spell Tragedy

They are designed for festive occasions, most notably to commemorate America's Independence Day, but often their use leads to severe injury, sometimes even death.

Last year, hospital emergency rooms treated about 9,000 injuries caused by fireworks. Although the figure reversed a dramatic three-year upward casualty trend, fireworks still accounted for about one-fifth of all fire- and explosion-related injuries reported to hospital emergency rooms.

As in previous years, injuries to the hands and head, particularly the eyes, predominated during 1987.

Each year fireworks cause more than 5,000 eye injuries. Of these, between 5 and 10 percent result in profound loss of vision.

"Children make up 75 to 85 percent of the eye-injured," said Dr. Bradford J. Shingleton, Director of the Eye Emergency Service at the Massachusetts Eye and Ear Infirmary and a staff member of the MGH–MEEI Trauma Center.

Dr. Shingleton said foreign bodies may strike and scrape the cornea and sclera, the outer surfaces of the eyeball. With sufficient impact and heat, the foreign particles can scar the eye tissue, causing a permanent visual impairment.

"More important," the doctor said, "if the particles penetrate the coats of the eye and enter the eye, all vision may be lost because of hemorrhage, infection, or inflammation."

Dr. Shingleton said that unsupervised activities account for 80 percent of fireworks-related eye injuries and that fully one quarter of those hurt are bystanders who were watching a display rather than participating in it.

Dr. Donald Chabot, who treats patients in the MGH Emergency Ward, described ear injuries as common during the fireworks season, which usually begins a week before the Fourth of July and extends three weeks beyond the holiday.

"The ear is very susceptible to harm from explosions," he said. "When most fireworks are set off, they undergo a conversion from some type of solid chemical to a gas. The gas expands very rapidly, creating an air pressure so intense it can perforate an ear drum."

Dr. Chabot also said that the danger from fireworks is not exclusively a childhood problem.

"I've been called on a number of times to treat middle-aged adults who were injured by fireworks while under the influence of alcohol or drugs," he said.

Injuries from fireworks, however, are likely to be more extensive in a child than in an adult.

It takes very little force for fireworks to destroy function in a child's hand, for instance. Most fireworks accidents occur while the devices are being held.

"A burn from an exploding firecracker tends to be a combination of a thermal burn and a deep chemical burn," said Dr. Susan E. Briggs, an MGH surgeon who is also Assistant Chief of Staff at our affiliated neighbor, the Shriners Burns Institute.

"Parts of the body which are very important functionally, such as the hand, often require a lot more hospital time following injury. If one burned a finger down to the tendons, the challenge would be not only to heal the burn but also to reconstruct the hand itself."

Dr. Briggs said that to penetrate deep into muscle, a burn usually has to be a significant one. Yet, it does not take much to injure a tendon in a child's hand because the tissues in it are so superficial.

Loss of fingers in a fireworks explosion is usually permanent because damage to the tissue is likely to be so extensive that no replantation is possible. Unlike the swift cut of a sharp blade, a blast produces a shattering effect.

In 1966, the federal government banned large fireworks having an explosive force capable of causing blindness, deafness, or loss of fingers, but many of these Class B devices—including M-80 salutes and so-called cherry bombs—are manufactured illegally each year.

The federal Consumer Product Safety Commission analyzed injury data collected over a seven-year period and found that more than 28 percent of the reported injuries were caused by illegal explosives.

The position of states regarding family-type, or Class C, fireworks varies. As of last year, 28 states and the District of Columbia permitted these fireworks. Two states, Hawaii and Nevada, had no fireworks laws, except at the county level. Seven states allowed only sparklers and other novelties. And 13 states, including Massachusetts, banned all Class C fireworks.

In May, New Hampshire passed a law allowing residents to buy "small" fireworks as long as the local fire chief has given the purchaser a permit. But visiting residents from other states can now purchase the same size devices, including bottle rockets, without a permit.

Dr. Shingleton considers bottle rockets to be the single most dangerous firework. Their name derives from the fact that

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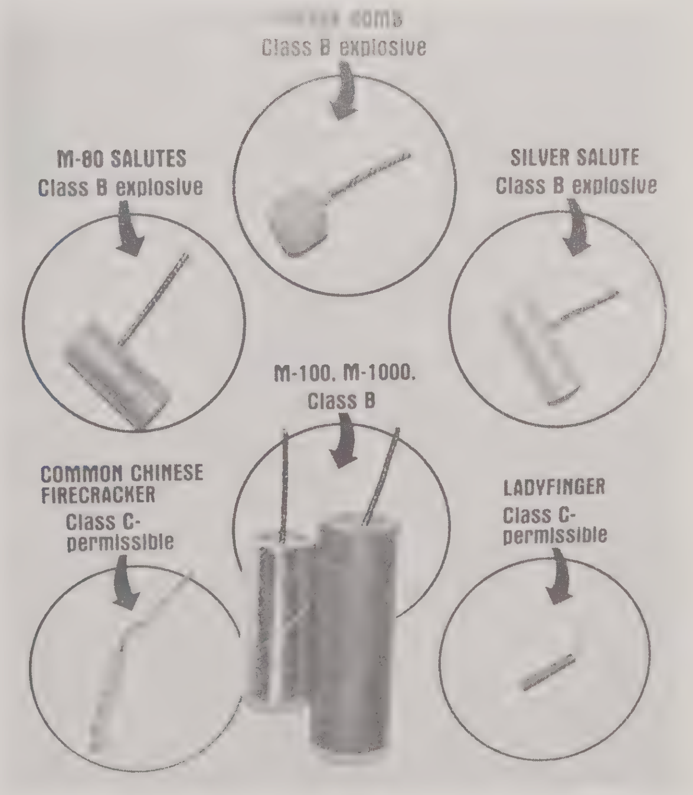

Federal law prohibits Class B explosives. A dozen states, including Massachusetts, ban Class C fireworks.

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Fireworks Sparklers Generate High Heat

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these stick-mounted missiles are launched from the necks of open bottles.

Properly discharged, the missile shoots straight into the air, and moments later a firecracker within the casing goes off to create a bang. But what if the rocket stands up in the bottle at an angle? When fired, it will follow a trajectory bringing it back to earth and possibly hit someone with a full thrust.

Last July 4th, a fire fighter in Chicago lost his life battling a blaze started by a bottle rocket in a 2½ story home. The National Fire Protection Association (NFPA) said a tenant had fired the rocket into the attic. Two days before the fire, the 44-year-old victim had been notified of a promotion that soon would have taken him off the fire-fighting line.

Often, when parents are warned against allowing their children to handle fireworks, the adults respond, "Oh, we're just letting them play with sparklers."

"Sparklers burn at more than twice the temperature at which clothing can ignite," said State Police Inspector Leo Voght, an explosives technician attached to the Massachusetts Fire Marshal's Office.

"There are numerous reports of children who accidentally lighted clothing while engaged in sword play with sparklers. They wound up spending anywhere from 10 to 30 days in a hospital."

Some years ago, three small children played with sparklers in the back yard of their home. Although supervised, one of the children smuggled some of the devices into their bedroom. After lights out, the youngsters got up, ignited the sparklers, and soon turned the room into an inferno. All three children died. The oldest was 11.

Inspector Voght said that the only fireworks legal in Massachusetts are the paper or plastic caps used in play guns. Each year, the Massachusetts State Police seize enough illegal fireworks to fill two or three large trailer trucks. Brought in from other states by people seeking to make a fast profit, the property is taken to a range and burned.

"One of the problems we run into is that as fireworks become accessible to children, many of the youngsters yearn for bigger and louder ones," the inspector said. "The next thing you know some are making pipe bombs."

He told of a 14-year-old boy from a community on the state's South Shore:

"The youngster was sitting on a stoop outside a shed making a pipe bomb, and the bomb went off while in his lap. The explosion not only cost the boy some fingers but also inflicted other permanent disabling injuries."

Predictably, fireworks accidents sometimes have left heavy property damage. The NFPA said the most devastating property loss traceable to fireworks in 1987 occurred the day after Independence Day in Arizona. Juveniles playing with illegal fireworks apparently obtained in nearby Mexico caused a blaze at an old World War II military site. Twenty-one woodframe buildings were destroyed with the loss estimated at more than $6 million.

Dr. Shingleton, who is also Clinical Instructor in Ophthalmology at Harvard Medical School, appealed for a long-term strategy to assure better control over the use of fireworks where they are legal.

"There has to be a highly visible, educational campaign," he said. "We simply cannot permit unsupervised child's play with these types of implements, or we will continue to have problems."■

Each year, fireworks accidents cause thousands of eye injuries, many resulting in profound loss of vision.

MGH
News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 6 September 1988

School Behavior Can Reveal Depression in a Child

As America's children troop back to school this month, many teachers may observe them with a much more analytical eye than ever before.

During the first week or so, classrooms typically become a setting for a whole range of behaviors. While most children act responsibly, some may start off in a rambunctious manner before settling down. Still others, at first shy and withdrawn, may wind up as the hellions of their group.

As the school term moves into a second or third week and the permissiveness of opening days gradually gives way to a structured, educational format, the more observant teachers will begin to take note of any consistency in patterns of unusual student behavior.

One pupil being studied may have just advanced from the familiar environment of a middle school to the new surroundings and challenges of a high school. Another child's family may have just moved into the school district, and not enough time may have elapsed for the youngster to cultivate new friendships.

"Anyone can have an off day," said Dr. Martin B. Keller, Chief of Outpatient Psychiatric Research at the MGH. "But if a child is unusually quiet or withdrawn, irritable or anxious, angry or provocative for four or more consecutive days, and this abnormal behavior pattern continues for longer than two weeks, then someone must talk to that youngster and find out what is going on in the child's mind.

"If a student's behavior is really extreme, one should not even wait the two weeks before intervening. Rapid intervention is crucial."

What teachers should be alert for are symptoms of depression. Allowed to go untreated, depression can become severe

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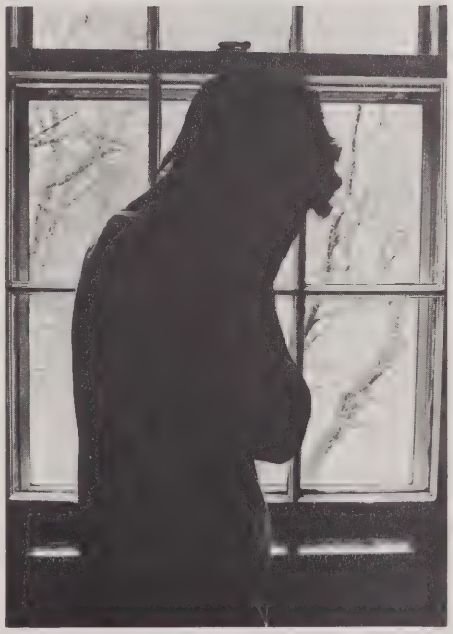

A decade ago, most psychiatrists were unaware that depression existed during adolescence and even early childhood.

Special Steps to Ensure Safe Hip Repairs

A study of a large series of total hip replacements performed at the MGH has shown that special measures taken in conjunction with the surgery were extraordinarily successful in reducing the risk of infection.

A recent article in the *Journal of Bone and Joint Surgery* reported that of 659 such operations conducted at the MGH between 1977 and 1984, only one patient developed an infection within two years after surgery. The same patient had previously experienced infection in that hip with the same organism.

Of the 658 procedures free of infection, 170 were reoperations. As a referral hospital, the MGH attracts a large number of patients needing reoperations. They are usually more complex than primary ones, take longer to do, and have a higher risk of infection.

In the follow-up beyond two years, six late or secondary infections occurred in the overall series. In five of these instances the infection had originated elsewhere in the body and had spread to the hip.

Dr. William H. Harris, Chief of the MGH's Hip and Implant Surgery Unit, performed all of the total hip replacements in the study. Dr. Harris and a Fellow in his unit, Dr. Steven F. Schutzer, now in practice in Hartford, Conn., coauthored the journal report.

Use of an artificial hip joint to replace a damaged or worn one, usually the result of arthritis, can turn people's lives around, eliminating pain and restoring near-normal function. Most patients are 60 years or older.

The number of total hip replacements performed each year has reached 120,000 in North America and double that figure worldwide.

"The number of reoperations, in particular, has increased dramatically," Dr. Harris said. "There is a huge pool of people who underwent total hip replacements 10 or 15 years ago. A number of

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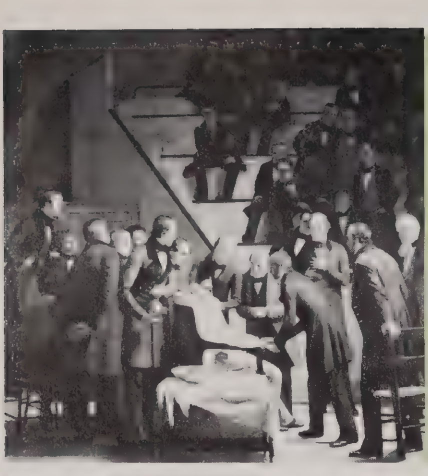
INSIDE

Page 5 . . . After 42 years, David Crockett keeps a hand in MGH affairs.

Page 7 . . . A lung bypass helps newborns to overcome breathing problems.



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EDITORIAL:

Children With Adult Problems

We tend to regard adulthood as a rite of passage. Children think differently than adults. Until youngsters reach a mystical age like 21, they are incapable of falling prey to adult problems. Or so we tend to believe. A few years ago a motion picture made us more conscious of childhood suicide.

A Page 1 article targets another problem we have tended to associate with adults: depression. By becoming more aware that it happens to children as well, we can all help them by securing professional assistance for them before their illness becomes more stubbornly rooted.

The Embodiment of Savoir Faire

It is difficult to believe that the French coined the expression "savoir faire" without having David Crockett in mind. He is the kind of person who can turn someone's social gaffe into a positive experience. At a ceremonial gathering his presence can assure success. And at a meeting he can be counted on to draw from his store of anecdotes to make a point as well as entertain. In short David Charless Crockett is a Boston legend.

It has been MGH's good fortune that Mr. Crockett has devoted most of his professional career to this hospital. As a Page 5 article describes, World War II served as the launching pad for his rise to prominence. His ability to handle secret and difficult missions made him invaluable to the Office of Strategic Services and earned him contacts that have aided him in civilian life.

Mr. Crockett has the talent which would have made it possible to achieve much in a number of professions. Fate made him the fund raiser for the MGH. By devoting himself to so many other charitable institutions as a trustee or a volunteer fund raiser, he has benefited them as well. His craggy eyebrows and white mane remain a familiar sight at many cultural events. Some men look distinguished when nature's head cover turns to snow. Mr. Crockett is every bit as distinguished as he looks.

Childhood Depression

(Continued from Page 1)

and prolonged. With proper diagnosis and treatment, there is usually marked improvement.

Until the mid to late 1970s, few psychiatrists were aware that depression existed in children. The age of earliest onset of depression was thought to range from the mid to late 30s.

Dr. Keller and a team of MGH investigators found in a study, however, that the median age for a first episode of major depression was the early 20s. Furthermore, among the patients studied as many as 25 percent had undergone a chronic episode 5 to 10 years earlier.

"This meant," said Dr. Keller, "that of the 8 to 10 percent of the country's population known to have experienced at least one period of major depression in their life, a huge number had the condition as far back as their adolescence or early childhood."

The MGH psychiatrist said depression at that stage of life was missed by most professionals because they viewed adolescence as a time of frequent turbulence and misbehavior. This, they thought, was part of the normal process of growth and development. Therefore, they did not look for signs of depression.

Since the 1940s, however, the rate of suicides among adolescents has tripled. People thought that these suicides stemmed primarily from fantasy, a transient shift in a child's mood or state leading to an impulsive act without full realization of the outcome.

"These children were often misunderstood," Dr. Keller said. "I think that frequently they were experiencing a profound depression that was being totally overlooked."

In its studies of childhood depression, funded by both the National Institutes of Health and the William T. Grant Foundation, Dr. Keller's team also found that if a parent had depression there was a 30 to 50 percent likelihood that an offspring would also develop the illness by the age of 17. If both parents were depressed, the risk increased even more.

Photographs: Pages 1, 3, courtesy of The Newton Tab; p. 4, Chris Maynard; p. 5, Scott Davis; p. 6, courtesy of David Crockett; pp. 7, 8, Myron Daniels

Drawing: Page 7, courtesy of Dr. John Fugate

This does not in itself prove the presence of an inheritance factor. If a child's parents are unable to provide much for the child because they are barely able to take care of themselves, it is very understandable for the child to feel deprived and become depressed.

Dr. Keller's colleagues on this research include Dr. William R. Beardslee of the MGH and Children's Hospital in Boston and Drs. Philip Lavori and David Dorer of the MGH. Dr. Leon Eisenberg, Chairman of the Department of Social Medicine at Harvard Medical School, is an adviser to this project, and Dr. Gerald L. Klerman, currently at Cornell Medical School, participated in early phases of the research.

Today, psychiatrists generally agree that depression can occur in children as young as 5 years. Whether it can develop at an even earlier age remains open to debate.

Dr. David B. Herzog, Chief of the MGH Child Psychiatry Consultation Service, said the criteria for childhood and adult depression which used to differ in many respects are now pretty much the same for everyone older than 7.

"One needs, however, to assess depression in children somewhat differently from that in adults," he said. "To a 7-year-old, for instance, several hours may seem more like a week, even a month. One must be sensitive to this time factor while trying to learn how often or for how long a young patient has experienced feelings of despair."

Dr. Herzog advised teachers that depression can mask a learning disability. "Some children have a difficult time in school and have to work very hard to measure up," he said. "For these students, the beginning of the school year is fraught with tremendous anxiety as well as sadness."

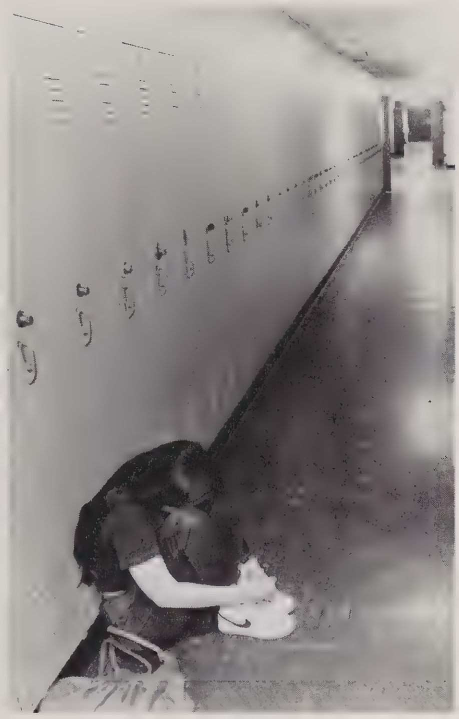
Depressed children also may seem preoccupied and fidgety. They may look tired, even disheveled, and refrain from interacting with other children.

If a child spends a tremendous amount of time on studies to the exclusion of all recreational activity, parents should take notice. Also, while it is commendable to allow a child privacy, if the youngster stays behind the closed doors of his room for hours at a time, that can be a warning signal.

Dr. Herzog said that these days parents are more aware than ever of childhood suicide. "People used to shudder at the thought of asking youngsters whether they had ever considered hurting themselves," he said. "The great fear had been, 'Well, if I ask them, I might put the thought into their head, and then they might try it.'

"That really has not been borne out at all. As a matter of fact, the question often prompts these depressed children to talk about things on their mind that nobody had been able to bring out before."

Dr. Keller, an Associate Professor of Psychiatry at Harvard Medical School, is currently principal investigator of a three-year MGH study of childhood depression financed by a $750,000 grant from the National Institute of Mental Health.



Teachers should be alert to the possibility of depression in a child who exhibits persistent abnormal behavior.

In the program's most recent report, published this summer in the Journal of Affective Disorders, *Dr. Keller, the principal author, wrote that depression in children and adolescents follows a pernicious course which is very similar to that of adults.*

Depression can become severe and prolonged if untreated. With proper diagnosis and care, there is usually marked improvement.

In children and adolescents, episodes of depression were found to last a median of between eight months and one year. Ten to twenty percent of children were still depressed after two years. And following recovery from major depression, it was clear that a far greater risk of new episodes existed than people had been aware of. Within five years of recovering from major depression, 72 percent of children had recurrence of the illness.

Dr. Keller and his colleagues also reported an extremely high rate of a second problem in children with major depression. In the MGH study, 53 percent of depressed youngsters also had another major psychiatric disorder at the same time or just before. These included such conditions as panic or anxiety states, attention deficit or conduct disorders, and substance abuse.

Nearly 300 children, many diagnosed as depressed, have been studied since the age of 6 by Dr. Keller and his team. They are currently interviewing each of these children and all other members of their families every six months for a minimum of three years. The hope is to follow these families as the youngsters grow through adolescence and into adulthood.

The interviews deal with such issues as interpersonal relationships, school functioning, family functioning, recreational activities, and the development and course of any psychiatric or nonpsychiatric medical illness and how it is treated. This is the first project ever conducted which studies children and their families in such careful detail.

Treating children for depression can take many forms. Dr. Herzog said studies indicate that antidepressant drugs are effective, but there are no long-term data yet on their use in children. Also, many parents simply refuse to accept drugs for their children.

"Youngsters with milder depressions may not need drugs at all," he said, "but for those with more severe kinds of depression, the medicines should be a part of the overall care."

Dr. Herzog, who is also Associate Professor of Psychiatry at Harvard Medical School, stressed the importance of individual and family psychotherapy.

"Much of the childhood depression we see occurs in the context of various kinds of school and family problems," he said. "Depressed children need to understand why they are sad and their families need to address the problems that may have led to the sadness."■

Special Measures Lessen the Risks Of Hip Surgery

(Continued from Page 1)

MASS GENERAL HOSP

To guard against possible air contamination during hip replacement surgery, Drs. William Harris, left, and Steven Schutzer wear special suits and helmets that prevent their breath from entering the operating environment.

these people may require reoperations because the older implants have a tendency to come loose.”

Without adequate prophylactic measures, however, the threat of infection from major hip surgery remains very real.

At one time, more than 10 percent of such patients developed massive infections. If they survived, their artificial joint had to be removed, leaving a limb that was up to three inches short. They had to wear a built-up shoe and use one, sometimes two, crutches.

Today, by incorporating three special safeguards into the operating program, the risk of deep infection, or sepsis, from the operation itself (as opposed to infection developing years later elsewhere in the body and spreading) has been reduced to well under 1 percent.

“The man who invented the operation devoted much of his life to trying to control the infection problem,” Dr. Harris said in an interview. “Britain’s Sir John Charnley, who died two years ago, realized that the aggregate success of his procedure was very dependent on overcoming the high risk of infection.”

Dr. Charnley originated two of the special prophylactic processes now widely used in operating rooms (ORs) for total hip surgery.

One measure provides for a flow of sterile air from the ceiling to the floor so that contamination which can exist in even a good OR will be reduced still further.

At the MGH, an operating room used primarily for total joint replacements has within it an enclosure called a greenhouse. Three sides are of glass, and the fourth has a plastic curtain. The patient lies on a table partially within the enclosure, but with head and shoulders outside the curtain. The sterile air flows around the open incision.

Before entering the OR, the air passes through HEPA (High Efficiency Particulate Air) filters, a product of NASA research. The filters trap most bacteria.

Dr. Charnley also introduced astronaut-like suits and helmets for members of surgical teams to wear so that the air they exhale will not enter the OR. Instead, the air is suctioned out of the room through tubes.

The third common way of reducing the risk of infection is to use antibiotics. Dr. John F. Burke, Chief of the Sumner M. Redstone Burn Center at the MGH, demonstrated in scientific studies that antibiotics best help a patient with an open wound if administered before the operation begins.

“We routinely start antibiotics before surgery unless it is a reoperation,” said Dr. Harris, who performed Boston’s first total hip replacement in August 1969. “When we redo a procedure, we first expose the wound and take cultures to establish whether an infection was present or not before we started.”

Dr. Harris prepares an improved cement that offers a stronger bond for a hip prosthesis.

Chances of infection increase if it had been present earlier. A decision on whether to reoperate depends on the prevailing circumstances. Dr. Harris said, however, that “even when patients have had an infection, we are now able to reoperate successfully most of the time.”

Infections can develop six to eight years after total hip surgery. In most cases of that kind, bacteria entered the bloodstream for reasons unrelated to the hip.

Pneumonia, appendicitis, diverticulitis, a gallbladder attack, an abscess, dental work, and even simply biting down hard can send bacteria through the blood. The organisms usually do not represent a serious threat unless they reach an area in the body, such as a damaged heart valve or an artificial hip, where resistance to infection has been compromised.

“Our advice to patients who have had a total hip replacement is to go on antibiotics any time they face a situation in which bacteria may invade the blood,” said Dr. Harris, who is also Clinical Professor of Orthopaedic Surgery at Harvard Medical School and a Senior Lecturer in Mechanical Engineering at MIT.

The results of Dr. Harris’ research reaffirm findings in 8,000 cases studied by a British team directed by Dr. Owen M. Lidwell.

But the Lidwell survey dealt mainly with primary, or “first time,” total hip replacements. Also, to embrace the large number of patients that it did, the study was a multicentered one.

The involvement of multiple centers

DAVID CROCKETT:

A Fondness for People Keeps Him Active

David C. Crockett, who joined the MGH in 1946 as its first Development Officer, has retired again. Well, almost. . . .

Mr. Crockett, who has figured in the raising of some $300 million for the hospital, first retired in 1973. He had his name removed from the payroll as he neared his 65th birthday. After a vacation, however, he returned to the MGH as a volunteer.

"I never publicized my stepping down," he said, "because I wanted to continue sitting on a number of committees."

Now, a typewritten note pinned to Mr. Crockett's office door and signed by him announces that "after 42 years at the Massachusetts General Hospital, I am closing my office. . . ."

The note informs those wishing to reach him to contact him at his home in Ipswich.

Mr. Crockett, now 79 years old, was asked by telephone where he could be interviewed by the *MGH News.*

"Meet me in my office on Friday morning," he said.

"But you don't have an office anymore," he was reminded. "You've closed it."

"Oh, don't pay any attention to the sign," he quipped.

Mr. Crockett said he eliminated his office staff because he no longer needed it but still comes to the hospital three or four days a week and continues to serve as Deputy to the General Director as well as Honorary Vice Chairman of the Committee on Research.

David C. Crockett, left, at a reception honoring publication of *The Massachusetts General Hospital, 1955–1980,* which he coedited with Sylvia B. Sutton and the late Dr. Benjamin Castleman

In addition to his MGH duties, he still pursues other activities that would take a heavy toll on a much younger man. Take the day before the *MGH News* interview:

"I left the house at 8:30 a.m.," he said, "and went to the Walter Fernald State School in Waltham for a 9:30 meeting of the Board of Trustees. I had been a board member for 30 years and was now called back as a consultant. I then hustled over to the Eunice Kennedy Shriver Center in Waltham for an 11 o'clock meeting of that institution's Board, of which I am vice president. At 12:30, I was at the Boston Biomedical Research Institute, of which I am a founding Trustee [now honorary], for a session there that lasted until after 2 p.m."

Mr. Crockett picked up his mail at the nearby MGH and went home, but his day was not over. That evening he delivered an address as former president at the annual dinner of the Trustees of Reservations, the largest private land conservation society in Massachusetts, finally ending his day at 11 p.m.

At one time, Mr. Crockett sat on 29 boards or committees. He still sits on about 15.

"Basically, I'm very fond of people," he said. The tall, distinguished-looking, white-haired gentleman has been described as "Brahmin to the core" but quickly points out that his family really had its roots in Philadelphia.

His fondness for people provided the thrust for his career as a fund raiser.

"People who are interested in giving money are, of course, very nice people," he said, "and my job brought me into close touch with them.

(Continued on Page 6)

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brought editorial criticism in the *British Journal of Bone and Joint Surgery.* The editorial questioned whether the study was controlled tightly enough to guard against the potential for error.

In Dr. Harris' study, all of the operations were carried out at one center, the MGH. All were performed by him. And, unlike the Lidwell project, he divided his patients into five groups, according to the complexities of the case. In this way, it was possible to examine for the first time the relationship between the magnitude of an operation and the incidence of deep infection.

A striking finding of the Harris study was that the magnitude of the hip surgery is not a factor in the incidence of early infection.

"Even if one does a long and difficult operation," the doctor said, "if the prophylactic steps are taken, it is still possible to reduce the incidence of early infection to a very low level."

His study showed that the risk of late infection – two years or more after surgery – needs to be addressed further. While the risks of infection in a reoperation and in a particularly complicated condition within the first two years are very low, the risks of late infection are higher than in a standard case, thus posing still more challenges.

Studies are also being conducted at the MGH to determine whether ultraviolet light offers a solution.

"UV light will sterilize the air in a room, thereby reducing the bacterial count," Dr. Harris said. "We are trying to see if UV light can serve as an alternative to the greenhouse and the body exhaust system. We would continue to use the antibiotics."

When Dr. Charnley introduced his total hip replacement in 1962, the devastation caused by infections proved so great that serious thought was given early on to abandoning the operation if the infection problem could not be controlled.

Through the years, however, the benefits of the surgery have been so striking they steadily fuel the determination of researchers to find ways of conquering the risks. ■

Looking Back at a Colorful Career

(Continued from Page 5)

"They knew darn well when I came calling that I wanted money. But I would never specify how much I was looking for. I would describe the hospital's need, and the prospective donor would then decide on the basis of the cause how much to give."

One major private contribution stands out in Mr. Crockett's mind. One day in 1970, he had lunch with Mrs. Jessie Bancroft Cox, whose father and grandfather had founded and developed Dow Jones and the Wall Street Journal. She wanted to donate to the hospital to honor her late husband, William C. Cox. He had died of cancer just a few months earlier. At the time, the MGH was trying to raise $9 million to start work on a building dedicated to fighting cancer.

The then MGH General Director, Dr. John H. Knowles, who died in 1979, and Dr. Howard Ulfelder, then chairman of the cancer building committee and Chief of the Vincent Memorial Hospital, also attended the luncheon. At the meeting, Mrs. Cox pledged $6 million.

The building, which was named for Mr. Cox, was dedicated in 1975, but the overall cost of the project was $22 million. Many hundreds contributed to completion of the structure in sums ranging from $2 million to two dollars.

Dr. Knowles had been exceedingly active in seeking support not only for the Cox Building but also for the Gray and Jackson Buildings whose construction began prior to the Cox project.

Mr. Crockett admitted that during his career he has sought sizable gifts, the "kind you get on a one-to-one basis."

"I wasn't interested in organizing troops to solicit small donations," he said. "That is a job for a professional organization to handle. I only have two feet."

But he never turned down any offer. One unusual gift came from a Texas rancher whose wife had been treated at the MGH for cancer.

"Although the treatment did not save his wife, the man showed up at my Ipswich home one day," Mr. Crockett related. "He wanted to express his appreciation to the hospital for its efforts, but all of his funds were tied up. He had driven to the house in a very fancy MG roadster, however, and he said, 'Here, take my car. It's garaged in Massachusetts, and I seldom visit this area.'"

The gift was accepted and sold, realizing several thousand dollars for the hospital.

After graduating from Harvard College in 1932, David Crockett held a number of fund-raising jobs, including volunteer positions in Boston with the Community Fund and professionally with a shortwave radio station, WRUL, later to become the Voice of America. But he came from a family of physicians. His father, Dr. Eugene A. Crockett, who graduated from Harvard Medical School 100 years ago this year, served as Chief of Otology at the Massachusetts Eye and Ear Infirmary. He died in 1932. It was not unusual therefore that Mr. Crockett eventually found a niche in the medical field.

Before this, however, World War II had intervened. Mr. Crockett served with distinction in the supersecret Office of Strategic Services (OSS), earning the Legion of Merit and other decorations.

During World War II, Mr. Crockett received high acclaim for work with the Office of Strategic Services, including missions behind enemy lines. Photo shows him resting outside Allied Force Headquarters at Caserta, Italy.

His duties in both the Mediterranean and European Theatres of Operation were those of special funds officer. These were secret funds available for behind-the-line activities and accounted for to Congress annually by the Director of the OSS, General William J. Donovan.

Major Crockett also engaged in a number of exploits. They included helping with arrangements for high-level talks in neutral Switzerland which led to the surrender of all German forces, including SS troops, in northern Italy in defiance of Adolf Hitler's explicit orders.

At one point during these conferences labeled Operation Sunrise, Major Crockett smuggled two generals into Switzerland wearing the dog tags of American sergeants. One general was Britain's Terence Airey, deputy to Field Marshal Harold Alexander for intelligence. The other was America's Lyman Lemnitzer, who later served as Chairman of the Joint Chiefs of Staff.

Major Crockett also was involved in gaining asylum in Switzerland for Professor Ferruccio Parri, a military resistance leader in northern Italy. He had been jailed in Verona under sentence of death before help arrived. Only four months later, he became Prime Minister of Italy.

After the war, Mr. Crockett was hired by the MGH in 1946 to coordinate and publicize the hospital's centennial observance of the first public demonstration of anesthesia in surgery.

The Ether Centenary in October of 1946 was a grand success but left Mr. Crockett's future in question. The hospital's trustees decided to retain his services, however, even though they could not identify his precise new duties.

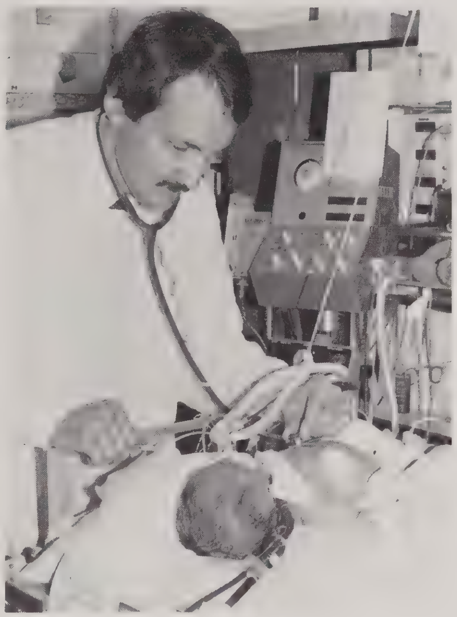
Mr. Crockett saw a need for financial support of basic research activities at the MGH and turned his efforts in that direction, seeking help from both private foundations and public agencies.

One of the earliest major gifts came from the American Cancer Society, whose chairman was General Donovan, Mr. Crockett's boss during the war.

In 1946, the federal government also began disbursing funds through the National Institutes of Health for research and hospital construction. Mr. Crockett made frequent trips to Washington to outline the needs of the MGH (*MGH News*, October 1987).

He is credited with joining members of the hospital's administration and Board of Trustees in fund raising roles that produced nine MGH buildings, including the Warren, Bigelow, Jackson, Gray, Tilton,

Lung Bypass Saves Lives of Newborns


Dr. John Fugate attends 5-day-old Christopher Riley in the MGH's Neonatal Intensive Care Unit. ECMO helped the baby overcome breathing problems.

An estimated 15,000 newborns die in the United States each year from pulmonary failure. But a device that temporarily takes over the work of the lungs may be changing matters.

Known as an "extracorporeal membrane oxygenator" or ECMO, the device was first used with adults in the early 1970s to give critically ailing lungs a chance to rest and recover, but instead of developing a normal architecture, the lungs of most adult patients became scarred.

The outcome proved quite different more recently when ECMO was tried with newborns whose respiratory failure resisted conventional treatment and who had a predicted mortality greater than 90 percent. By providing oxygen support and relieving demands on the heart, ECMO enabled the lungs of many infants to heal.

As a consequence of these successes, and the efforts of Drs. John H. Fugate and Daniel Ryan, the MGH expects to participate shortly in a government-sponsored, multicenter study of how ECMO may help older children with severe pulmonary problems. And in Europe, new ECMO trials, with some revisions, have been conducted among adults, this time with reports of greater success.

An estimated 45 medical centers in this country have ECMO capability for newborns, but only two such centers are situated in New England—Children's Hospital and the MGH, both in Boston.

Such capability recently saved the life of the new son of Mr. and Mrs. Mark Riley of Waltham, Mass. Christopher Riley was three weeks overdue and weighed 10 pounds 2 ounces when born at a suburban Boston hospital.

As his birth neared, fetal monitoring revealed that Christopher was suffering from periodic lack of oxygen. Doctors delivered the baby quickly by Caesarian section and found that he had aspirated meconium, a waste material in amniotic fluid.

After the meconium, resembling thick pea soup, was suctioned from Christopher's throat and windpipe, he was placed in the hospital's nursery, but he continued to have difficulty breathing.

The baby was transported to Children's Hospital and put on a respirator set to administer 100 percent oxygen. But the infant continued to go downhill. Since Children's only ECMO machine was already caring for another newborn, Christopher was rushed to the MGH.

"Christopher was 22 hours old when he arrived," said Dr. Fugate, Associate Director of the hospital's Pediatric and Neonatal Intensive Care Units. "He was on ECMO for five days, then was transferred to a respirator at a much lower setting than before for only an additional 18 hours. Finally after three more days in the neonatal unit when his course of antibiotics finished, he was taken home. The crisis was over."

At present, ECMO use is restricted to babies no older than 7 days who face a greater than 80 percent risk of death. An infant's gestational age must be at least 35 weeks and its minimum weight, 4 pounds 6 ounces.

Severe genetic or anatomic disorders could bar ECMO use. Another contraindication is bleeding in the brain. Since ECMO involves the use of heparin, an

(Concluded on Page 8)

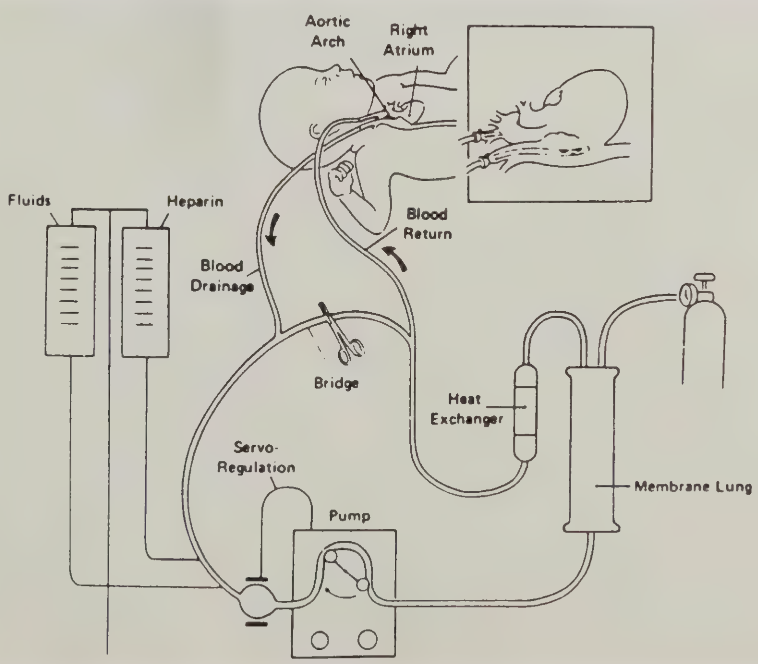


Diagram shows how a membrane oxygenator takes over the work of a newborn's critically ailing lungs so that they can rest and hopefully recover.

Cox, Vincent–Burnham, Edwards Research, and Bartlett Hall.

Mr. Crockett is married to the former Marion Yates, whom he met while both were working for the OSS. On their first anniversary, the couple became the parents of twins, Susan and Christopher, and now also have five grandchildren.

The Crocketts live on a 15-acre farm bordering the Castle Neck River in Ipswich. Although the river leads to the Atlantic and Crane's Beach, only a half mile away, the Crocketts often swim at a dock in front of their house where the water is warmer. Mr. Crockett also keeps a 12-foot Boston whaler at the dock.

"I got rid of my sailboat," he said. "The family thought I had become too old to handle it."

Mr. Crockett prides himself in a garden he nurtures. He spends much time in the summer canning corn.

"Right now, I'm freezing spinach," he told his interviewer. "We have enough spinach to sink a ship."■

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Lung Bypass a Measure of Last Resort

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anticoagulant, any bleeding would intensify.

ECMO has countered several types of respiratory failure. In addition to meconium aspiration, they include respiratory distress syndrome and severe pneumonia as well as persistent pulmonary hypertension caused by either lack of oxygen or a congenital defect such as a diaphragmatic hernia (*MGH News*, April 1981). In some infants, the hypertension could stem from severe hyaline membrane disease.

ECMO has a number of components, including two tubes, or catheters, that are connected to key vessels in the neck; a pump to maintain blood flow; an oxygenator; and a heat exchanger.

To bypass the lungs, one tube is connected to the internal jugular vein to take blood from the right side of the heart. This blood then flows through the pump to a spiral-coil type of oxygenator which contains a thin sheet of silicone rubber substituting for lung tissue. As molecules of oxygen pass through this silicone membrane into the blood, carbon dioxide diffuses in the opposite direction.

The oxygenated blood then goes through a heat exchanger to maintain a proper temperature and reenters the body through a tube connected to the internal carotid artery. From there, the blood flows into the aorta, the body's main artery to resume general circulation.

During the bypass process, not only is heparin added to the blood externally to guard against clotting but all of the baby's medications and nutrition are also given by this route.

Dr. Fugate said one of the main reasons why ECMO remains a measure of last resort is that insertion of the large catheters into vessels of the neck can disrupt their normal transport of blood.

"The internal carotid artery supplies blood to the head and brain," he said. "And although there is good collateral flow, one doesn't want to obstruct this artery needlessly because of the vital centers involved."

Only a few days after Mr. and Mrs. Mark Riley of Waltham, Mass., were photographed visiting their ailing son, he was well enough to be taken home.

The doctor, who is also Instructor in Pediatrics at Harvard Medical School, recalled a baby who was transferred to the MGH from a hospital in western Massachusetts.

"The baby met all of the criteria for ECMO care in our telephone conversation with the hospital," he said, "but when the infant arrived, our neonatologist made a few adjustments on a respirator, and the baby improved quite dramatically. Although still critically ill, the baby showed enough progress to avoid immediate use of ECMO."

Dr. Fugate and Dr. Ryan, a pediatric surgeon, collaborated in establishing the pediatric ECMO system at the MGH. Dr. Ryan came to Boston a year ago from Cincinnati's Children's Hospital where he had gained considerable ECMO experience.

An MGH anesthesiologist, Dr. Warren M. Zapol, who conducted pioneering work on ECMO and helped to develop the membrane oxygenator used to save Christopher's life (*MGH News*, November 1975), served as an adviser to the pediatric specialists. Drs. David Todres, Director of the Pediatric and Neonatal ICUs, and Patricia K. Donahoe, Chief of Pediatric Surgery, also provided valuable assistance.

Dr. Fugate expects that the customary population in the MGH Children's Service will provide 12 to 15 candidates a year for ECMO treatment and that referrals from other hospitals will further increase the number.■

New to the News?

We have added new names and updated old addresses for the MGH News. However, we need your help to keep our list current. Please let us know if our listing of your name or address is incorrect.

MGH News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 47 No. 7 October 1988

Urologists Ponder the Impact of New Medical Care

Less than five years ago, close to 200,000 Americans a year underwent surgery or some other invasive procedure for the removal of kidney stones.

Today, it is uncommon to hear of a stone being extracted through an incision made in the kidney or in the ureter, the channel which carries urine to the bladder.

The surgery has largely been supplanted by such nonsurgical techniques as breaking up stones with externally transmitted shock waves and using a pulsed dye laser to fragment ureteral stones in areas the shock-wave device cannot reach, such as behind the pelvic bone.

Just as stone management has undergone vast changes, nonsurgical methods are also on the horizon to replace certain operations on the prostate gland and the bladder.

A walnut-sized male organ, the prostate gland virtually encircles the canal (urethra) that carries urine from the bladder through the penis and out of the body. During sexual activity, the prostate secretes a fluid that helps to transport sperm through the penis.

Since prostate surgery alone accounts for about half of a general urologist's practice and up to 40 percent of the specialist's annual income, Dr. George R. Prout, Jr., Chief of the MGH Urology Service, said the next few years may see many urologists reassessing their role in health care.

Referring to proposed new treatments

(Continued on Page 2)

Patients Control Their Own Pain Relief

Anyone who undergoes a major and fairly invasive surgical repair is usually quick to admit that "getting better hurts."

Consider someone with lung cancer. To remove a growth on a lung, surgeons must first penetrate the patient's chest wall. This usually involves cutting or retracting one or more ribs. When the patient later awakens from anesthesia, chest pain accompanies every breath.

Until the healing process is well under way, a standard treatment for acute, or self-limited, pain is the giving of morphine, a potent narcotic which acts upon the central nervous system.

Since pain is a purely subjective experience, however, with only the patient capable of describing the presence and extent of any discomfort, the bedside practice of giving morphine has drawbacks. Insufficient morphine will fail to eliminate pain while too much can result in drowsiness, nausea, vomiting, dizziness, and even inadequate breathing.

What would be the optimal dose? Everybody is different. The pain that torments one person may not bother someone else very much. And a large person may require more medication than a small individual.

In the last half dozen years or so, more improvements have been made in the management of postsurgical pain than in any previous time. Among the most dramatic advances has been the development of a method that allows patients to control their own pain relief by administering

(Continued on Page 4)

Deborah Harrison, RN, sets up a patient-controlled analgesia pump for a woman who has just undergone major surgery.

Inside

Page 6 . . . Heart patients with implanted defibrillators help each other.

Page 7 . . . A new test quickens the diagnosis of certain nerve disorders.

MGH News

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EDITORIAL:

The Uncertainty Created by Change

Patients these days are bewildered by the rapid changes in health care technology. So are physicians. The advances come so quickly that each doctor needs to assimilate information about them and put them in perspective. What are the advantages, for example, of MRI, PET, and CT scanning? To order these diagnostic tests optimally, the nonspecialist has to know which ones to apply for a specific patient.

Then there is another kind of fallout from the technological revolution. How do the advances affect the future of different medical specialties? In this space we have explored how some radiologists, for example, now do certain procedures as well as the diagnostic tests that one associates with radiology.

A Page 1 article looks through the other end of the telescope at what happens sometimes when science finds new ways to carry out old treatments. Urologists have traditionally operated on patients to remove kidney stones and have performed certain procedures on the bladder and prostate gland. The final word is not in yet on how much new procedures such as shock-wave lithotripsy will dominate the urologic horizon of tomorrow. Already, however, some urologists are beginning to wonder whether some of these new procedures described in the article will change the practice of urology. Will there be fewer traditional operations and more noncutting techniques? Some worry that there will be many fewer urologists needed. The same question may also be asked in other specialties as research changes their practices.

Throughout history new knowledge and/or inventions have altered human pursuits. As man learned to cultivate crops like corn and beans and to raise animals for food, the number of hunters diminished. As the green revolution spreads its wonders, nations need far fewer people in traditional farming. In medicine, physicians no longer need to spend time treating smallpox which medical science has eradicated.

Inevitably the nature of professions changes as the world itself changes. The Polio Foundation broadened its world to birth defects once the Salk and Sabin vaccines pretty much eliminated new cases of polio from the map of America. Regardless of how medical investigators change the practice of medicine, there will be physicians who will be needed to address new diseases or new twists to old ones. What about a time without disease? Such a world, as blissful as its sounds, would bring its own difficulties. But that is another matter.

Urology

(Continued from Page 1)

for enlargement of the prostate—a condition that affects more than 350,000 men annually—Dr. Prout said some of the nonsurgical techniques may not work well, but it is hard to believe that all of them are going to fail.

"At the speed we're going, I predict that operations on the prostate will decrease in the next two and a half to three years," he said.

"New treatments will be available on a trial basis in the very near future. In fact, one company expects to complete clinical trials on a new medication by the spring or summer of 1989."

At present, the cost of surgically removing obstructing prostate tissue with the patient hospitalized five to nine days may total anywhere from 5 to 13 thousand dollars, depending on the city and state where the operation is done. Massachusetts, incidentally, is far below the national average in cost.

Since the problem addresses mainly the Medicare age group, the cost represents a major expense to the federal government. It is anxious to see the development of a cheaper but equally effective procedure.

Researchers in Israel have developed a technique to shrink the prostate with heat. A microwave unit introduced through the rectum raises the temperature of the prostate to 42 or 43 degrees centigrade (107.6 or 109.4 degrees Fahrenheit), a level incompatible with cell life. At the same time, a computer-controlled stream of water keeps the rectal wall cool.

"The heat causes cell death particularly around the urethra where benign prostatic hyperplasia [abnormal, noncancerous cellular growth in tissue] begins," Dr. Prout said. "As the hyperplasia develops, the cells grow both outwardly and inwardly. During inward growth, they compress the diameter of the urethra."

The microwave treatment, said to feel a little like an enema, is given on an outpatient basis. A patient is treated twice a week for five weeks.

Another new technique for dealing with prostate enlargement uses a balloon. It is extended through the urethra to the location of the prostate and then is inflated. The pressure exerted against the prostate kills the cells of the excess tissue by cut-

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Photographs: Page 3, (upper), Scott Davis; all others, Myron Daniels

Most kidney stones are being fragmented today with nonsurgical techniques such as this shock-wave method.

ting off their blood supply.

A third technique has the patient taking a pill. It is designed to block an enzyme, 5-alpha-reductase, from converting the male hormone, testosterone, into dihydrotestosterone within the prostate. Many physicians believe that dihydrotestosterone is responsible for increased cellular growth in the gland.

Another pharmacologic agent acts against receptors which increase the tone of smooth muscle tissue in both the prostatic urethra and the bladder neck. Increasing the tone decreases the diameter. By blocking the receptors, the muscles can relax, and the bladder can contract, enabling the patient to void.

Dr. Prout said "there is a wide open possibility that hyperthermia [the microwave system] and the 5-alpha-reductase inhibitor may be useful one day in treating patients with cancer of the prostate. Hyperthermia may be of tremendous value especially if added to radiotherapy in treating people with low-stage prostatic cancer."

Dr. Prout, who is also Professor of Surgery at Harvard Medical School, served 13 years as Chairman of the National Bladder Cancer Group, embracing specialists from a dozen major institutions, including the MGH. The group's studies demonstrated what Dr. Prout termed "the tremendous impact of drug therapy in the treatment of patients with invasive bladder cancer."

In one study, 69 patients, all unsuitable for excision of the bladder (cystectomy) because of age or general health, received the drug cisplatin simultaneously with irradiation.

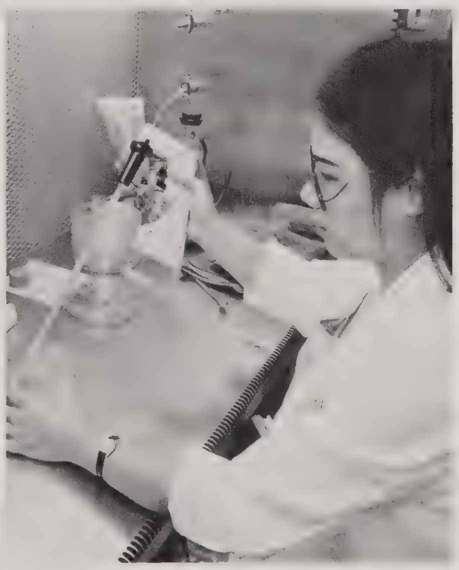
The treatment led to the disappearance of tumor in nearly 80 percent of the patients. The response was 30 percent higher than noted earlier in patients who had received irradiation alone.

"We don't know how far chemotherapy will take us in the treatment of invasive bladder cancer, but soon we will be starting another protocol at the MGH which will use the drug hematoporphyrin," Dr. Prout said.

"The drug concentrates in bladder tumors and is then subjected to a laser's red beam. Since the drug is sensitive to red, the tumor cells are destroyed. We will use this method to diminish the incidence of recurrent superficial tumors."

In a preliminary study that employed hematoporphyrin derivative on 19 patients in China who had superficial bladder tumors, Dr. Prout and his associates reported last November in the *New England Journal of Medicine* that all tumors in nine patients were eradicated. Of the remaining 10 individuals, all but one had a reduction in tumor size, number, or both, of 50 percent or more.

Urologic investigators at the MGH also have developed a monoclonal antibody (a protein capable of zeroing in on a highly specific target) to detect tumor cells in urine. Customarily after a bladder tumor is found and treated, the patient undergoes every three months a checkup called a cystoscopy, which is an invasive procedure. Since many patients are ill with other conditions or are elderly, the use of a monoclonal antibody to check a urine sample can eliminate the need for the invasive test.



Technician Khaw Aii Hwa feeds monoclonal antibody cells being grown in the Urology Research Laboratory for use in detecting tumor cells in patient urinary samples.

Dr. Prout sees urologists developing new skills to apply the nonsurgical remedies that are replacing conventional surgery in their field. But operations, he said, will still be a vital part of urologic care.

"Much of the practice of the pediatric urologist is concerned with the surgical repair of congenital abnormalities," Dr. Prout said. "Many forms of trauma require surgical intervention.

"Except for surgery, we still don't have much to offer the patient with metastatic cancer. Some kidney and bladder stones are so resistant to the new nonsurgical approaches that an operation is the only effective modality for their removal.

"Tremendous advances have been made in the design and implantation of prosthetic devices for people who are impotent. And increasing numbers of men who undergo sterilizing vasectomies are having a change of heart. They're coming back to the urologist, seeking to become fertile again through reversal of their operation."■

Other Urologists Eye the Future

Changes in urology are occurring with such speed that a major new treatment introduced only four years ago has already been refined.

"In 1984, we were one of only six hospitals in the country to have a lithotripter to break up kidney stones nonsurgically," said Dr. Niall M. Heney, an MGH urologist. "Today, there are not only some 150 of these devices in use across America, but a new generation of lithotripters has already appeared."

Unlike the original machines, the new ones do not entail a tub bath for the patient or any anesthesia, and they are substantially less expensive to use.

Dr. Heney said kidney stone patients much prefer to avoid surgery because an operation means about a week in the hospital and three to four weeks of convalescence. With nonsurgical removal of stones, a patient can usually return home in a day or two and go right back to work.

Dr. Heney foresees an ever increasing trend among urologists toward performing nonsurgical procedures without anesthesia or with only local anesthesia in an

(Concluded on Page 4)

Pushing a Button Brings More Pain Relief

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morphine to themselves.

At the MGH, such a system is managed by the Postoperative Pain Service (PPS), a branch of the Anesthesia Department's Pain Unit, directed by Dr. Donald P. Todd.

Since an anesthetist, who renders a patient insensible to pain in preparation for surgery, knows about pain pathways and the effect on them of various drugs, it is only logical that postsurgical pain management should also fall within the purview of such specialists.

An initial concern about letting patients give themselves morphine was that they might become addicted.

"Many people tend to equate the short-term use of narcotics for acute pain with the psychological dependency on drugs that is characteristic of street addicts," said Dr. Daniel B. Carr of the recently established PPS. "Actually, several studies should have settled this issue.

"In one, the researchers studied psychologically normal patients who had pain that was expected to be self-limited and found that the incidence of addiction arising from their use of pain medicines was under one tenth of one percent."

A colleague in the Pain Service, Dr. Bucknam McPeek, added that hospital patients who self-administer morphine for pain tend to wind up using less of the narcotic than patients whose medicine is administered periodically by a nurse.

Patient-controlled analgesia (PCA) entails the use of a special, battery-powered pump suspended from a bedside stand. Containing a syringe filled with morphine, the pump is connected to a tube (catheter) that delivers the drug intravenously through a patient's arm.

The pump constantly delivers a small basal dose of the drug, usually one milligram per hour, to the patient. Feeling a need for more, the patient can press a button for an instant extra shot. The PCA system is programmed to ensure that the total quantity of drug delivered does not exceed a safe level.

To determine a suitable dosage for a

Urology Will Always Need Surgical Skills

(Concluded from Page 3)

office or outpatient setting.

He spoke, however, of a relatively new operation (a percutaneous, ultrasonic, nephrolithotripsy, or PUL) for extracting a large stone from a kidney. After a radiologist first plots the shortest route to the target through the skin, the urologist makes a small incision and follows the operating tract to the stone. A diagnostic and treatment tube called an endoscope provides both interior lighting for the surgeon and the means to pull the stone out.

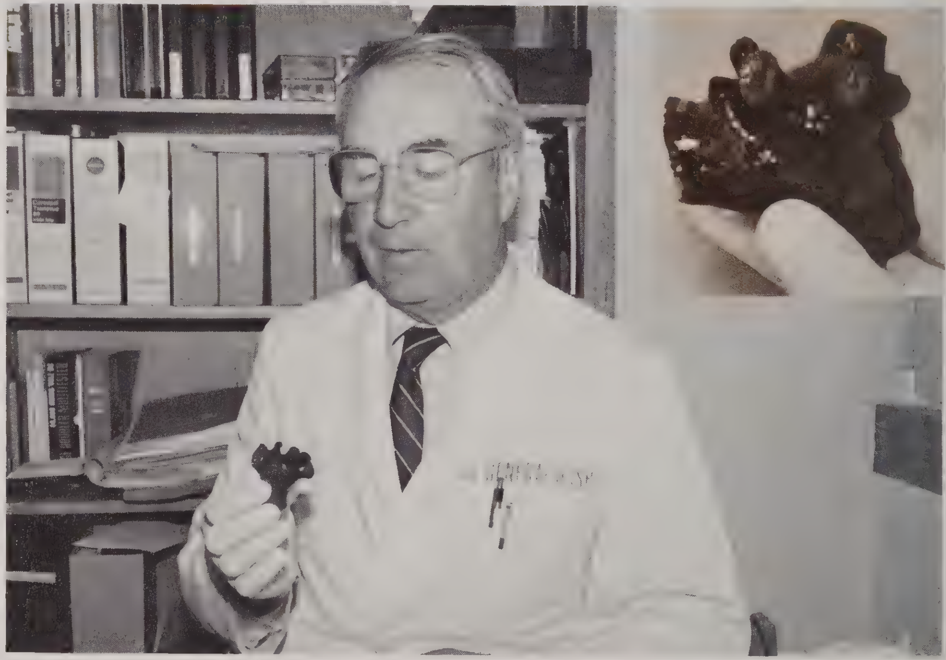
Since the procedure does not call for an extensive incision, the patient recovers quickly.

Dr. Alex F. Althausen, another MGH urologist, emphasized the continuing importance of surgery in fighting urologic diseases.

"There has to be an option," he said. "Together, the shock-wave and laser treatments, pioneered at the MGH by Dr. Stephen P. Dretler, reduce stone surgery by about 90 percent. The remaining 10 percent of patients still need an operation."

Referring to treatment of an enlarged prostate using either heat or a balloon technique, Dr. Althausen said both call for multiple visits to the physician. "In the long run, these nonsurgical methods might take more time than conventional surgery," he said.

What excites Dr. Althausen most is the prospect of inhibiting an enzyme to stop prostate diseases, including cancer.



Dr. Hugh Young displays a huge, rock-hard, "staghorn," kidney stone that could be removed only by surgery.

"Rather than look for another treatment, it would be very appealing if one could find out what was causing the disease," he said. "A patient might then be able to take a pill, an injection, or whatever, and the prostate would shrink, rather than grow. That's the future approach to cancer . . . not how to operate on cancer but how to stop it from happening."

Dr. Hugh H. Young II, also of the Urology Service, said that regardless of what nonsurgical techniques come into practice, they will need the surgeon's technical skills.

"These skills may be even more demanding and require more precision in some instances than what are now required in surgery," he said.

He also said that while patients may regard nonsurgical care as simpler, the need for repeat visits and thus repeat instrumentation could turn out to be riskier than operating once to relieve an obstruction.

Dr. Young said it is still too early to judge the merits of hyperthermia in combatting an enlarged prostate.

"Many years ago," he said, "we used liquid nitrogen to kill prostatic cells through freezing. The cells died but instead of the prostate shrinking as expected, the gland became a slimy blob, and extra procedures were needed to extract the tissue. The cryotherapy concept was quickly dropped."■

patient, PPS staff members study the individual's general medical history. They inquire whether the patient had such conditions as low blood pressure, heart disease, or lung disease. Did the patient have other surgery in the past? If so, how much narcotics were given during the operation? Did the patient's recovery progress well?

"With this information and knowing the patient's age and weight, we can set reasonable limits for a drug dosage," said Dr. Todd. "Even having set those limits, we check regularly on the patient's pain status, as well as vital signs, and make any necessary dosage modifications."

Each morning, one of the pain service physicians and Elizabeth Ryder, RN, MSN, a clinical nurse specialist, visit PPS patients on thoracic, gynecological, and orthopedic floors.

Ms. Ryder instructs floor nurses on the use of PCA and carries out any needed problem solving. She said that patients generally are on the pump for several days.

Floor nurses have the option of increasing a morphine dose within limits, or even decreasing the dose, if they feel a change is appropriate.

Whitney MacQuarrie, a 55-year-old patient from Hingham, Mass., who underwent a total hip replacement, had high praise for the pump system: "Psychologically as well as physically, this is one of the best ways to relieve pain that I can think of. It's like a kid having a pacifier."

During three days on the pump following his surgery, Mr. MacQuarrie pushed the button three times to receive extra morphine. He said his pain came not from the hip but from his lower back due to extended lying on the back.

Even though some pain may be present, patients occasionally prefer not to press the button for more pain killer. The knowledge that extra morphine is available serves in itself as a measure of comfort.

Dr. McPeek said that pain patients do visibly better on the pump: "They breathe more deeply, move around better, and are able more easily to follow the instructions that they are given. There is good evidence that the patients have fewer complications and leave the hospital sooner."

Marcia Were, 61, of Delmar, N.Y., a registered nurse for 35 years, underwent major thigh surgery in May at a hospital in Albany and later received injections of a pain-killing narcotic.

"The shots would knock me out," she said, "but I would awaken after two and a half hours and feel the pain returning. The problem was I could not receive another shot for two to three more hours."

In August, Mrs. Were underwent surgery again on the same thigh, this time at the MGH. She had the benefit of PCA postsurgically and found her recovery much less painful. She listed a number of operations she has had in the past and said, "I have never felt as well right after surgery as I have after this latest operation."

Many MGH surgeons are particularly enthusiastic about the PCA program and have worked with anesthetists to ensure its success.

Ms. Ryder said that the hospital's nurses also are delighted with the program because they no longer have to worry about giving patients shots every few hours or leaving one patient's side to respond to another's immediate need for more morphine.

"We hope to extend our pump service soon to adolescent patients," Ms. Ryder said. "The ultimate goal is to be able to serve as many as 50 pain patients at a time throughout the hospital. Referrals keep coming in at an ever increasing rate."■

Button suspended over Marcia Were's bed enabled her to give herself extra doses of pain-relieving morphine when needed.

Following hip replacement surgery, Whitney MacQuarrie told Elizabeth Ryder, RN, of the Postoperative Pain Service, that having his own pain relief button was like "a kid having a pacifier."

Support Group Builds Confidence in Special Device for the Heart

At a support group meeting, Katherine Traynor, RN, helps heart patients to better understand the role and features of their implanted defibrillators.

Every few months, a group of heart patients assemble in the MGH's Wang Ambulatory Care Center to discuss their mortality.

Each has been pulled from the brink of death at least once after the normal electrical impulses controlling the heart's pumping action became irregular and caused the heart to stop. Prompt application of CPR (cardiopulmonary resuscitation) often can keep such a patient alive until professional medical help arrives.

Ever at risk for a recurrence of the condition called ventricular arrhythmia, each of these patients is now protected by a device implanted in the body. In the event of another arrhythmia, the instrument, a cardioverter–defibrillator, is poised to shock the heart's rhythm back to normal.

Although the automatic defibrillator has led to a survival rate described by one MGH cardiologist as "nothing short of remarkable," patients wearing the implant still express a host of concerns.

To respond to these concerns and ease the psychological impact they sometimes impose, MGH nurses and physicians led the way last December in organizing a support group of some 50 patients and arranging for periodic get-togethers.

At these two-hour meetings, the patients air their apprehensions and receive advice from fellow patients, hospital professionals, and others closely associated with the sole manufacturer of their lifesaving defibrillator, Cardiac Pacemakers, Inc., of St. Paul, Minn.

The patients pose such questions as "What is the extent of the restrictions I must live under? How do I know the defibrillator will work when it is supposed to? What might activate the defibrillator accidentally? If someone touches me during a discharge, will that person suffer a shock? Will the defibrillator interfere with CPR efforts?"

Asked more often than any other is the question, "What will the defibrillator's discharge feel like?" After all, the jolt that is emitted is one million times more powerful than that of the more common, implanted cardiac pacemaker, which keeps the heart from slowing excessively but would have no effect on a heart which stops pumping because of a very rapid and irregular rhythm known as ventricular fibrillation.

Robert Kellie of West Bridgewater, Mass., the 15th of some 85 MGH patients to receive the automatic defibrillator since 1983 (*MGH News,* November 1985), compared its sensation to a shock that would result from putting a finger into a light socket.

Another analogy was suggested by Dr. Jeremy N. Ruskin, Director of the MGH's Cardiac Electrophysiology Laboratory which was the first in New England and one of the first in the nation to offer the device:

"Some patients have likened the sensation to being kicked in the chest from the inside. But the point to keep in mind is that the device works. The cardioverter–defibrillator is very effective at saving lives."

Dr. Ruskin cited a report published in June in the *Journal of the American College of Cardiology* on an 18-month follow-up of 94 patients from the MGH and the Hospital of the Good Samaritan in Los Angeles who underwent surgery between June 1983 and March 1987 for implantation of the device.

The report showed that 6- and 12-month survival rates were 98.7 and 95.4 percent respectively. Forty-six patients experienced at least one discharge of the automatic defibrillator under circumstances consistent with an otherwise potentially fatal ventricular arrhythmia.

Dr. Patricia A. Kelly of the MGH, principal author of the journal article, wrote that the survival rates substantially exceed those of patients treated with conventional medical regimens.

Dr. Ruskin said that drugs are still the mainstay of treatment. Two thirds of the patients with implanted defibrillators are receiving drugs to help lessen the frequency of their arrhythmias.

"The implanted devices [which are four inches high, three inches wide, and three quarters of an inch thick] serve as a safety net," Dr. Ruskin said. "We know that with an implant the chance of a patient staying alive is extremely high. The defibrillator is on guard 24 hours a day, ready to act anywhere the patient goes."

Speaking at a recent meeting of the support group, led by Ms. Beverly Buczynski, RN, a nurse assigned to the hospital's private pavilion, the Phillips House, and Ms. Katherine Traynor, RN, a clinical nurse specialist, Dr. Ruskin assured patients and many accompanying family members that the implants impose few restrictions on life-styles.

"About all we advise patients to do," he said, "is avoid rough body contact [such as in contact sports], which could interfere with the defibrillator implanted in the abdomen as well as the lead wires to the heart, and also to stay away from any strong electromagnetic field."

A prime example of the latter is an airport security gate through which travelers pass to be checked by a metal detector. People wearing a defibrillator can request a personal body search instead.

If someone touches a patient as a defibrillator discharges, the other individual might feel a minimal amount of current, but there is no safety risk. Also, there is no evidence that the defibrillator interferes with efforts at CPR.

Dr. Ruskin said that some antiarrhythmic drugs may be capable of altering the amount of energy required to defibrillate the heart, but he added, "We've never seen a case in which a device effective at implantation failed to work at a later date because of a drug the patient was taking." As a precaution, however, patients should clear all of their medications with their physician.

The defibrillators, sealed in titanium and powered by lithium batteries, are checked periodically by members of the Cardiac Arrhythmia Service. An external device placed on the skin close to the im-

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A New Test to Detect Nerve Disorders

The key to unlocking secrets of the human mind has turned another notch.

Many leading medical centers are adopting a test developed at the MGH that makes it possible for the first time to quickly and easily locate disorders in a major part of the autonomic nervous system (ANS).

Autonomic nerves help to regulate vital bodily functions which are usually not consciously controlled, functions such as sweating, changes in blood pressure, sexual arousal, digestion, tear and salivary secretions, etc.

Comprising one of two segments of the ANS, the sympathetic nervous system quickens autonomic activity during panic or alarm. The second segment, the parasympathetic system, does the opposite, slowing involuntary reactions to normal as calm returns.

In the past, tests for nerve disorders (neuropathies) concentrated on the activity of the largest and fastest conducting nerve fibers in the body. Such tests, employing electromyography (EMG), could, for example, quickly detect a very common malady in the workplace, compression and entrapment of the median nerve in the wrist (carpal tunnel syndrome) (*MGH News,* September 1987).

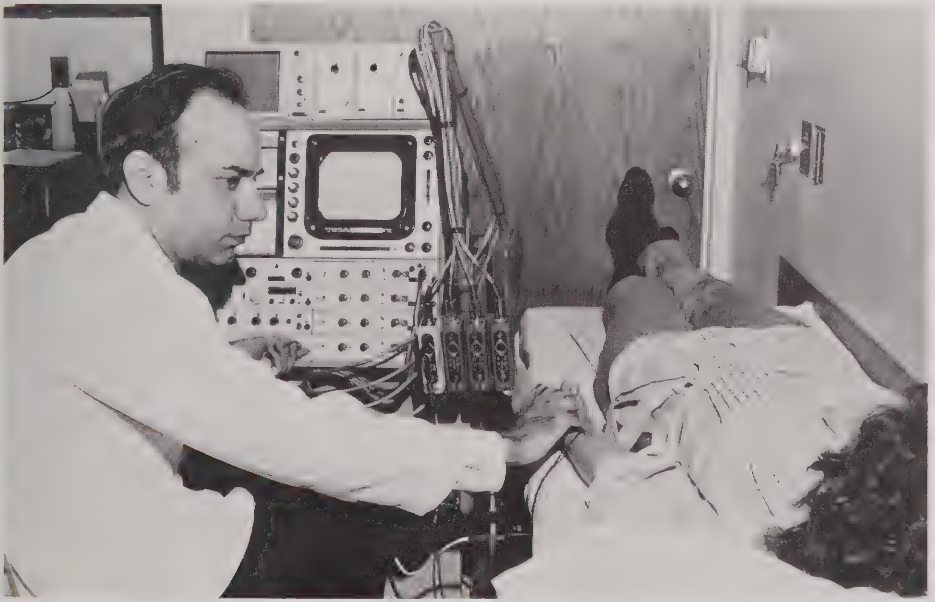
Conventional diagnostic techniques, however, cannot record ANS activity because autonomic nerve fibers are small and slower conducting.

Without compiling and analyzing extensive computerized data—a laborious, time-consuming, and costly task—investigators have often been unable to pinpoint autonomic dysfunctions.

The MGH test, developed by Dr. Bhagwan T. Shahani, Chief of the Clinical Neurophysiology Unit, offers a new noninvasive approach to studying the sympathetic portion of the ANS.

Employing the same EMG equipment used for customary nerve conduction studies, Dr. Shahani has been able to identify sources of ANS nerve disorders in less than 45 minutes and at a substantial saving for the patient.

Dr. Shahani's test records changes in the electrical voltage measured from the surface of skin due to a variety of stimuli, such as an electrically-induced tap, a sensation of cold, or a sudden, unexpected loud noise. Since most sympathetic fibers stimulate blood vessels in the skin as well as in sweat glands and other autonomic organs, the skin response is one way of recording overall autonomic activity in various parts of the body.



Dr. Bhagwan Shahani administers an electromyography test to look for a possible nerve problem.

The test has proven particularly important in evaluating diabetics whose disease commonly extends to the peripheral nerves, which contain those of the ANS.

Another use for the test involves people who drink too much alcohol and develop problems with sweating. They may not sweat as much as they normally would. This could affect regulation of body temperature. As with the diabetic, only a test of small fibers governing the autonomic nervous system would disclose nerve abnormalities affecting the sweat glands.

In the skin test, the recording of a response on an EMG machine indicates normal sympathetic fiber activity. Absence of a response suggests the presence of disease.

Dr. Shahani, who is also Associate Professor of Neurology at Harvard Medical School, said nerve biopsies have consistently corroborated findings of the skin response test.

To determine the status of the parasympathetic nervous system, Dr. Shahani turns to a test pioneered elsewhere but which the MGH has helped to establish as a practical and useful diagnostic tool.

An electrocardiogram (measuring the electrical activity of the heart) is obtained on a patient and, using an automated technique, investigators then measure the variability of intervals between successive heartbeats during both normal breathing and deep breathing.

Variability is normal. It is when variability lessens that suspicions are aroused of possible lesions of the vagus nerve, one of the body's longest nerves. It extends from the brain to the heart and then to the abdomen.

Dr. Shahani began his research at the MGH in 1971 after pursuing postdoctoral neurologic studies at Oxford University in England.

In addition to skin response and heart tests to detect ANS dysfunction, Dr. Shahani's unit is one of few in the country to conduct "collision" studies to measure the activity of motor fibers going to muscles and one of only two to do sensory tests to learn how a person's perceptions of cold and heat may relate to pain.■

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Support Group Overcomes Patients' Fears

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planted instrument can assess how well it is working. The defibrillator can usually monitor the heart for two to three years or deliver more than 100 discharges before needing replacement.

Dr. Andrew B. Littman, who codirects the Behavioral Medicine Unit of the MGH–Harvard Cardiovascular Health Center, acts as a psychiatric consultant for support group members who have problems coping.

"Some people with serious heart disease have such anxieties they won't live more than a few miles from a hospital," he said. "Also, such patients often tend to avoid engaging anew in activities that were taking place when they suffered their cardiac arrest. An office worker who was operating a computer at the time, for instance, might later shun the computer out of fear of precipitating another attack."

Dr. Littman said that the patients are not aware they are deliberately avoiding these activities. They simply have a subconscious fear of them.

"It's like the old story of a person falling off a bicycle," the doctor said. "The solution is to get right back on. Avoiding the experience will not in itself be helpful. In fact, such avoidance can remove areas of gratification in life."

Some patients tell of stress preceding an arrhythmia. Studies have shown, Dr. Littman said, that such stress as anger, impatience, and frustration can have a role in precipitating an arrhythmia. He said that one must try to understand what specifically was stressful and attempt to deal constructively with it.

Three Massachusetts patients with implanted defibrillators—from left to right, Paul Cohen of Newton, Ronald Turpel of Salem, and Robert Kellie of West Bridgewater—chat while awaiting the start of a support group session.

Dr. Littman encourages family members to join patients at support group meetings. "Relatives want to help their loved ones but mistakingly feel that they have to walk on eggshells," he said. "Everyone benefits by saying what is on one's mind. Because of the illness, the patient's family role, such as being the main breadwinner, may have to shift. There has to be a family flexibility to make such changes possible."

Beverly Buczynski said a principal goal in organizing the support group was to have patients network with each other. She told of a patient whose defibrillator fired while he was attending church. He became so fearful that for about a month he refused to enter his church again. Contact with other patients made him realize that the device had saved his life and that he should go to church to express his thanks.

Ms. Buczynski also told of a 32-year-old woman whose defibrillator had misfired. At first fearful that she had erred in having the device implanted, the patient attended a support group meeting and heard a businessman tell how much he relied on his defibrillator.

The man did extensive traveling on business and thought his illness would bar further trips. But following his recovery, he said, he had returned to his job and once again was traveling extensively. He had complete faith in the technology that was protecting him. The talk helped to calm the fears of the young woman.

Once while on duty on the second floor of the Phillips House, Ms. Buczynski and other nurses heard a loud moan and rushed to the room of a patient whose defibrillator had just discharged.

"Are you all right?" the nurses asked the patient who had experienced several firings in the past.

"I'm fine, thank you," the man responded, rather matter-of-factly. "Saved again!"■

MGH News

Massachusetts General Hospital, Boston, Massachusetts Vol. 47 No. 8 November 1988

Ethical Issues in the Care of Very Sick Newborns

To the 200 guests representing many professional disciplines, 16-year-old Gregory St. Lawrence of North Attleboro, Mass., looked like the average teen-ager.

He was a likeable, well spoken, young man of average height, weight, and looks. But as Dr. Michael S. Jellinek, Chief of Child Psychiatry at the MGH, began to publicly interview Greg and his parents, Mr. and Mrs. Walter St. Lawrence, it quickly became clear that they had an extraordinary story to tell.

Leaders in medicine, ethics, law, religion, sociology, and government had gathered at the MGH for a one-and-a-half-day conference on neonatal ethics sponsored by the hospital and the MGH Institute of Health Professions.

Convened in the auditorium of the MGH-affiliated Shriners Burns Institute, the delegates from 17 states learned that Greg's mother gave birth to him after a pregnancy lasting only six months. At delivery, he weighed 2 pounds 1 ounce which later fell to 1 pound 10 ounces.

In the early 1970s, most newborns weighing under 2¼ pounds succumbed, often as a result of a lung, heart, or neurological disorder, or a combination of illnesses (*MGH News,* December 1982).

Greg had lung and heart problems and later developed seizures. His mother's three previous pregnancies ended in two miscarriages and a prematurely born in-

(Continued on Page 2)

A Simple Device Enhances Bone Repairs

Few people outside of medicine have ever heard of Crouzon's disease. It is a hereditary disorder which during fetal development prevents normal formation of bone to shape the head and face.

The condition, fortunately rare, is heart-rending and in the past has posed major challenges to surgical specialists attempting to right nature's wrong.

In the last few years, however, a new procedure made possible by a European invention has given surgeons the edge needed to correct the congenital malformations.

Recently at the MGH, Dr. Michael J. Yaremchuk of plastic surgery and Dr. Paul H. Chapman of pediatric neurosurgery worked with this device, called a miniplate, as they reshaped and enlarged the skull of an eight-month-old girl from eastern Massachusetts.

The skull of the infant, whom we will call Cathy, not only was poorly formed but also was too small for her brain. Concern for the brain spurred the decision to operate without delay.

During a six-hour operation, Drs. Yaremchuk and Chapman exposed Cathy's skull from the forehead on back and removed four major segments. One by one, the distorted but flexible sections—representing about 40 percent of the upper part of the skull—were refashioned and then repositioned in the skull.

Instead of using wires to hold the bones

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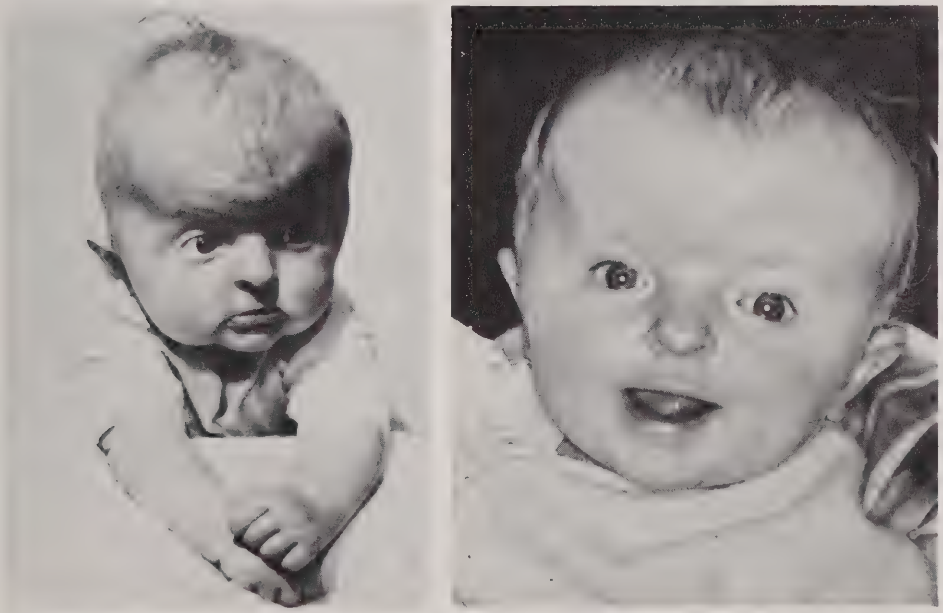
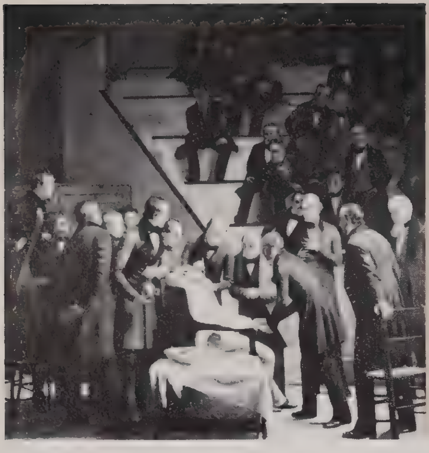


Born with a disorder that prevented normal formation of bone, this child responded dramatically to surgery that included use of bone fasteners called miniplates.

Inside

Page 5 . . . Donated cadaver tendons replace torn knee ligaments.

Page 6 . . . Neglect of nails can lead to many disorders.



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EDITORIAL:

Why Do Athletes Cheat?

The recent Olympics focused perhaps as never before on the use of drugs to improve athletic performance. Several competitors and/or their feats were disqualified. The fear remains that others escaped detection. In events like weight lifting, cognoscenti say, virtually all competitors use drugs to cheat.

One needs to ask why athletes cheat. Is it because "everyone else" uses drugs to enhance his or her performance, and therefore failure to do so puts the ethical athlete at a competitive disadvantage? Is it because the chances of getting caught are so slim?

What about the health risks? Aren't they well known and potentially severe? A significant percentage of athletes have heard of the possibility of organ failure from chronic use of the most commonly employed performance enhancers, anabolic steroids.

So why risk crippling or even death? An important part of the answer seems to be that those grave risks lie somewhere down the road. What lies nearby is the possibility of a medal—maybe even the gold. Is that mere chance enough? Apparently so. A number of athletes have said they would willingly die in a few years if they could achieve greatness in their chosen sport.

That attitude could only come from a glorification of sports. As everyone knows, Americans idolize the man who floats the long touchdown pass or hits the baseball over the fence. Nor is that solely an American trait. Many nations idolize their sports heroes.

Nor is this endemic to the 20th century. Pheidippides' exploit in 490 B.C. has been extolled in all ages. (He was the original marathoner, the young man who ran from Marathon to Athens with the news of Athens military victory over the Persians. He shouted: "Rejoice! We conquer." Then he collapsed and died at the finish line, so to speak. It was not until 1896 that the "marathon" became part of the Olympics.)

Maybe what we need is more belief and less lip service to the saying: "It isn't whether you win or lose. It's how you play the game." Ultimately it really is.

Neonatal Ethics

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fant who lived only 12 hours.

Greg clung to life, but during 19 days at the hospital where he was born, he lost weight, and his complex of illnesses ultimately caused his transfer to the MGH's Neonatal Intensive Care Unit (NICU) where he spent a total of five months.

"The baby hovered between life and death many times," said Dr. David Todres, Director of both the Neonatal and Pediatric ICUs. "He had to be on a respirator because he didn't breathe adequately. At one time he developed a life-threatening infection. He was allowed to go home after three months but was readmitted three weeks later with heart failure.

"We were deeply concerned that despite all of our efforts this child might wind up severely handicapped. Yet it was our philosophy that where uncertainty existed we would give the infant the benefit of the doubt and help the baby in every way that we could."

Greg not only survived but by the time he entered the fifth grade he had also overcome all of his difficulties except for a fine motor coordination problem which still impairs his penmanship and ability to draw.

Now a sophomore at North Attleboro High School, Greg consistently earns honors in his studies (and has won highest honors twice). He enjoys working with computers and expects to enter that field after college. During his 1987–88 school year, the youngster devoted two days a week to helping a teacher instruct fifth grade students in word processing.

In the interview with Dr. Jellinek, Greg said he planned to marry some day and have children. "How many?" the doctor asked. Greg's analytical mind had a ready response: "Two-point-six."

In February 1974, Dr. Todres had brought together about 100 leaders in medicine and other disciplines to discuss the moral, ethical, and legal issues that affect the many facets of newborn care.

The dilemma that existed over Gregory St. Lawrence and whether it would have been wise to resuscitate him in the event such a question arose was discussed at the

Photographs: Pages 1, 4, courtesy of Dr. Michael Yaremchuk; p. 3, Kennetha Bigham; p. 6, courtesy of Dr. Dinesh Patel; pp. 7, 8, from *Diseases of the Hair and Nails*, courtesy of the author, Dr. Howard Baden

Drawing: Page 4, courtesy of Carmella Clifford

Anne Armstrong, RN, left, discusses various aspects of nursing in the Neonatal Intensive Care Unit with a visitor, Mary Riffe.

meeting. The significant risk of major disabilities was also a topic.

As co-organizers of the latest conference, held on September 16 and 17, Dr. Todres and Ruth B. Purtilo, Ph.D., Ethicist-in-Residence at the MGH and Henry Knox Sherrill Professor of Medical Ethics at the MGH Institute, decided to invite the St. Lawrence family.

"Their appearance was aimed at giving the audience a sense of what we're trying to achieve in our NICU," Dr. Todres said, "and to illustrate some of the difficulties and uncertainties that exist at the very beginning of life, and how things might turn out."

Some of the leading issues which confronted the first MGH conference have changed, however, because of steady advances in the technology employed in neonatal ICUs.

"For every advance, there's a price," said Dr. Jellinek, who also serves as a consultant to the MGH NICU. "If you try to save lower and lower birthweight infants, some will turn out very successful, like Greg, but others will not. For every baby saved, there will be a certain amount of morbidity . . . an ongoing burden for families and for society to keep others with serious handicaps well cared for."

Dr. Purtilo said that where in the early 1970s the key question was "Can we rescue that child?" a leading question now is "What are the moral limits of intervention for a child?" In addition, she said, "There are these social policy issues: How shall we reason well about allocations of funds for further health care? Shall support be based on need or perhaps on what the individual can be expected to return someday to society? These are very profound ethical questions."

Dr. Purtilo also pointed out that judgments solely between a physician and a sick child's parents no longer carry the impact they once did. "The best individual judgment in the world," she said, "does not get effected without some policy dimension imposing on that judgment."

Dr. Donald N. Medearis, Jr., Chief of the MGH Children's Service, said that by and large physicians and nurses caring for a particular baby should not have to take economic concerns into account but only what is best for that infant.

As for allocating funds, Dr. Medearis agreed that very large sums have been spent on neonatal ICUs, but he added:

"Most babies who go to a neonatal ICU survive, and most of those who survive live a normal life. That is a very important consideration in establishing priorities in medical care."

Dr. Medearis, who served from 1979 to 1982 on a presidential commission for the study of bioethics in medicine, also commented on the controversy surrounding proposed transplantations of organs to dying infants from babies born with total or partial absence of a brain (anencephaly).

"Anencephaly is usually but not always diagnosed correctly," he said. "Moreover, it is not a single defect but a variety of defects. The baby with anencephaly is born alive and usually has some degree of brain functioning.

"Most anencephalic babies die within 48 hours after birth, but several percent live a week or two. If the anencephalic infant is allowed to die, the period in which there is a lack of oxygen may be sufficient to damage its organs. And, more frequently than desired, the organs turn out to be abnormal or not fully developed."

Dr. Medearis said that in West Germany physicians do not regard the anencephalic baby as being alive, and they go ahead and use the organs. "I consider that morally wrong," he said.

Dr. Medearis said the issues surrounding the anencephalic infant should be addressed nationally, not decided locally. "I hope," he said, "that the congressional advisory group on ethics will consider these matters."

Delegates to the neonatal ethics conference expressed particular interest in how conflicts over critically ill newborns are handled. Physicians and nurses may realize that a baby has no chance for life. Yet

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Dr. Ruth Purtilo moderates a panel discussion whose participants include, from left, Dr. Ruth Macklin of Albert Einstein College of Medicine; George Annas, J.D., and Rabbi Joseph Polak, both of Boston University; and Dr. Ernlé Young of Stanford University.

Miniplates Hold Bones in a Precise Shape

(Continued from Page 1)

together, the surgeons turned to the miniplates as fasteners.

Made of titanium or a cobalt-chrome alloy (Vitallium), each miniplate is about two inches long and looks like a metallic strip containing a row of perforations. The holes accommodate screws ranging upward in length from three millimeters (about an eighth of an inch). The size of the screw needed is determined by where it has to be placed in the bone.

"Once a bone has been bent it is very difficult to keep it shaped that way," Dr. Yaremchuk said. "Miniplates have proved to be a vast improvement over wires because wires have been known to slip, allowing bones to move.

"The miniplates not only hold the bones rigidly in place, they also maintain in three dimensions the exact anatomical form that is needed."

The sections of the baby's skull that were reshaped and rearranged will develop a new blood supply and grow together. Whether the miniplates will be removed later has not yet been determined.

"Although we made the cranial vault larger, the soft tissue inside remains small," Dr. Yaremchuk explained. "The miniplates provide the stability we must have. Without them, we might lose our correction. Our future observations of the patient will determine whether the plates will be taken out or left in."

Cathy's operation went so smoothly that she spent only a week in the hospital. In only two weeks, she was back to the usual activities of a baby her age.

Cathy's mother said that her daughter can now for the first time sleep through the night, and her appetite has improved.

Before the surgery, people used to stare at the infant when her mother took her on shopping trips. "Mom says no one stares at the baby now," Dr. Yaremchuk remarked. "No one thinks that there is something wrong with this child. And that's really what we have tried to do . . . assimilate her into the mainstream."

Later in life, Cathy may need surgery on her lower face to correct a protrusion. The surgery must wait to avoid possible damage to her developing teeth. As Dr. Yaremchuk put it, "There are lots of things that we will be able to do to fine tune her appearance."

Twisting a miniplate to rigidly hold rejoined bones in a desired way

Not long after Cathy's operation, an 18-year-old college student was admitted to the MGH following an automobile accident in which he fractured virtually all of the bones in his face. Miniplates were used to reconstruct his face and in ways that left no scars.

In another demonstration of real interplay between reconstructive and cosmetic surgery, the miniplates were used to mend a frontal bone in the young man's forehead, but instead of an incision being made across the forehead to reach the bone, the cut was made far back in the hair so that over time the cut will be hidden.

The same incision permitted the surgical team to repair breaks in the bony upper orbits of the victim's eyes. Fractured lower orbits were mended through lower eyelid tissue that hid the incision.

Working from inside the mouth, the surgeons installed miniplates to repair fractures in the jawbone, palate, and both cheekbones.

Dr. Yaremchuk said that only a handful of medical centers in this country use miniplates in craniofacial repairs. Working with Dr. Paul Manson, Dr. Yaremchuk gained five years' experience with the devices at Johns Hopkins Hospital and the Shock Trauma Unit (Maryland Institute for Emergency Medical Services Systems) in Baltimore, mainly repairing facial fractures, before joining a few months ago the Plastic Surgical Division at the MGH.

Miniplates actually have been used for other bone surgery in this country for the past 10 years or so. In 1980, an orthopedic surgeon at the MGH, Dr. Jesse Jupiter, traveled to Switzerland to study miniplate applications at centers in Basle, Bern, and Davos.

Dr. Jupiter said that Swiss surgeons had not been happy with old methods of bone healing, such as prolonged use of casts by patients or keeping them in trac-

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Neonatal Ethics

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the parents may insist, "Keep going, no matter what."

Dr. Jellinek said that one of the most important steps to take is to understand the relationships that have built up between the primary physician, primary nurse, and the family. Is the quality of their communication adequate? Do the parents feel comfortable with the caregivers and fully understand the issues?

From a psychiatric point of view, Dr. Jellinek said, there may also be historical elements influencing the parental position. The parents, he said, may feel to blame for their child's plight and think the only way to expiate their guilt is by spending the rest of their lives caring for the handicapped offspring.

Anne V. Armstrong, RN, one of 29 staff nurses in the MGH's NICU, said the nurses have a unique role in the ethical decision-making process:

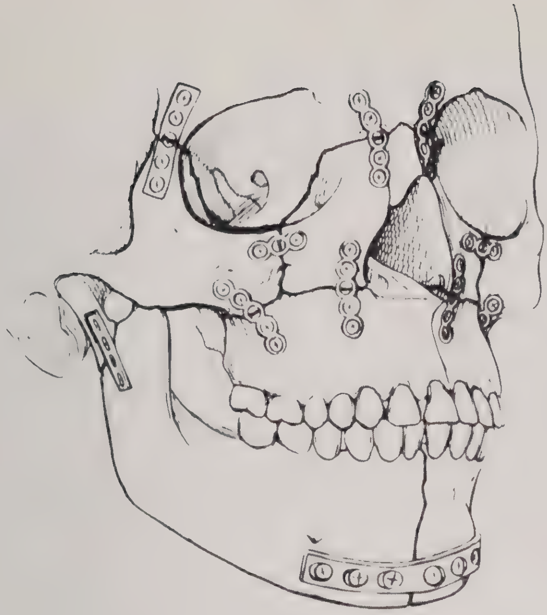
"We are in a position to hear what parents are told, to listen to their understanding of the information presented, and to provide clarification, additional information and/or suggest reinforcement of the information presented."

Positioned at the bedside eight to 12 hours a day, Ms. Armstrong added, the NICU nurses are able to assess the response of infants to pain, determine their level of consciousness, etc, to provide further input toward the making of an ethical decision.

The immense challenges and responsibilities posed in health care by critically ill newborns were underscored to the conference by Walter St. Lawrence following the interview with his family.

In a voice filled with emotion, Mr. St. Lawrence said he wanted to take a minute "to thank the MGH for giving me my son." He added:

"I also look at the other side of the coin. Perhaps it has to be the other way for some. I'm glad that it is your decision to make, not mine."■



Drawing illustrates the many ways that miniplates can assist in facial bone repairs.

tion in bed for a long while. The bones healed but the muscles, tendons, and joints became stiff and very weak. Also, it was hard to maintain a bone in a good position.

The surgeons looked for an alternative healing technique and learned of a Belgian surgeon who healed bone under compression, squeezing the segments together. With this in mind, the Swiss used their renowned metallurgic and precise instrumentation capabilities and came up with major advances in plate and screw design and application.

The plates and screws were applied initially in the repair of large bones. The results proved much better than earlier techniques, but the new method required special training and technical precision. The broken bone, for one thing, had to be exposed. Gradually, miniplates evolved for use on small bones.

When miniplates were first introduced in the United States, they received a lukewarm reception. Some doctors who tried to use them without having had the necessary training did not get optimal results and doubted their value.

Dr. Jupiter, a member of the fracture and hand surgery services at the MGH as well as codirector with Dr. Robert J. Scardina of the foot and ankle service, found quick uses for the miniplates.

"A hand injury treated with a cast would often require three or four weeks in the cast and then months of rehabilitation because the tissues had become tight," he said. "But when miniplates are used, the patient often does not need any therapy beyond two or three weeks."

The muscles, tendons, and joints do not have a chance to become stiff because the plate holds the broken bone so perfectly that the hand can move earlier. The bone heals even as the hand is being activated.

"In effect, instead of treating the skeleton first and then going on to therapy, including perhaps reconstructive surgery, the surgeon treats the whole hand at once," Dr. Jupiter said.

In addition to bones in the hand, miniplates are used for repairs on the foot, around the elbow, wherever any small bone has broken. Sometimes they are applied in conjunction with larger plates on an injured forearm or shinbone.

In 1983, Dr. Jupiter addressed an international hand society meeting to report on 32 patients treated at the MGH who benefited from miniplates. The plates had been used in connection with the cutting, straightening, and lengthening of bones and in replacing a cancerous bone with a preserved, donated cadaver bone.■

Cadaver Tendons Replace Disabled Knee Ligaments

Surgeons are beginning to turn to preserved spare parts to repair one of the most common disabling injuries in sports.

A torn knee ligament, most often the result of a jump coupled with a sudden pivot, has ended the careers of countless athletes. Even with surgery, if the ligament involved was one of two that crisscross in the knee joint, full recovery might take a year or longer.

By using cadaver tendons (allografts) and arthroscopic techniques that include direct viewing within a knee, orthopedic surgeons are finding that even though recovery time remains long the patient's hospitalization is shorter and pain is less. The incisions, five to seven inches long with other procedures, are reduced to only a few tiny punctures.

A torn ligament within a knee joint can be replaced with other tendons from the patient by using arthroscopic methods in conjunction with open surgery. The incisions would be only a couple of inches long. Allografts, however, eliminate the need for the patient to sacrifice other knee tissue, such as hamstring tendons or part of a quadriceps tendon.

Four ligaments act as stabilizers for a knee. They work with muscles to enable the very complex joint to bend, straighten, and rotate. One ligament extends along the inner part of the knee, a second along the outer part, and within the knee joint are the two cruciate (cross-shaped) ligaments, the anterior (front) and posterior.

Injury to the anterior cruciate ligament (ACL) causes the most problems. It is the one for which allografts are currently being used in pioneering work by some surgeons, including Dr. Dinesh Patel, Chief of Arthroscopic Surgery at the MGH.

Dr. Patel explained that the inner and outer knee ligaments can be repaired readily because, unlike the cruciate ligaments, they enjoy a plentiful blood supply. Injury to the posterior ligament is usually not so disabling that surgery is necessary.

In a "jump and cut" action, a loud pop usually signals injury to the ACL. This is followed by pain, swelling, a pooling of blood in the knee, and difficulty walking. In contrast, damage during sports action to knee cartilage, which acts as a cushion in the joint, does not cause a pop or immediate swelling.

Without treatment of the ACL, a person might function satisfactorily by modifying activity. Any handicap would probably be minor. Continued high activity, on the other hand, could damage the knee's cartilage and lead to degenerative arthritis within the joint.

Dr. Henry J. Mankin, Chief of the MGH Orthopaedic Surgery Service, proposed in the mid 1970s that allografts be used in reconstructing ligaments. A bank preserving donated bone and tissue at minus 70 degrees centigrade had been established at the MGH in 1971 for the

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Nails Merit Close Scrutiny and Care

Few parts of the human body are pampered more than fingernails and toenails.

They are cleaned, cut, filed, buffed, polished, and painted.

But to think of nails only in cosmetic terms is short-sighted. Fingernails, in particular, serve vital functions which improper care can seriously compromise.

For one thing, fingernails support and protect organs in the fingertips which govern the sensation of touch. Without nails, fine finger movements, such as picking up small objects, would be impaired.

To assist in manipulating objects, fingertips also contain more sweat glands than any other part of the body except the armpits. Sweat gives friction to fingertips, allowing a better grasp.

Since humans live in an environment seething with bacteria and other microscopic substances, the importance of nails as a barrier to disease becomes quickly evident.

Probably no part of the body comes into contact with injurious organisms or irritants more frequently than fingers. We dig in the garden, use cleaning agents containing harsh chemicals, and dangerously expose open wounds on the fingers.

Both fingernails and toenails are made of a tough, rope-like protein called kera-

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Ligament Substitutes Can Be Preserved For a Long Time

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replacement of diseased bone (*MGH News,* January–February 1981).

At first, Dr. Patel performed conventional open surgery to replace a torn ACL with an allograft. The substitute tissue worked well, but the operation did require long incisions which meant up to a week in the hospital for the patient. Also very frequently there was scar tissue to deal with as well as nerve disturbances that produced tingling sensations or numbness. Prolonged physical therapy was usually required.

In 1984, Dr. Patel began installing ACL allografts using the new arthroscopic methods. A slender, optical instrument, the arthroscope is inserted into a knee joint through a tiny incision. Used in conjunction with cool fiberoptic lighting, the scope permits direct viewing of the entire interior of the joint. By making three more tiny punctures, the surgeon can insert the instruments needed to operate (*MGH News,* April 1980).

After inspecting the joint and removing any loose debris, Dr. Patel usually takes out the torn ACL, but he said it is not necessary, especially if it is still attached to other tissue.

The replacement used by Dr. Patel is not ACL tissue from the dead donor. The cruciate ligament in the cadaver's knee is sometimes useful in substitute bone work. Dr. Patel obtains instead a portion of tendon that had been at the back of the donor's leg. The tendon had helped to stabilize a foot.

"The tibia [shinbone] tendon acts no differently than other tendons," the surgeon explained. "The allograft is about four to five inches long and half an inch in diameter. We always combine two tendons to obtain the needed thickness."

Before using any preserved tissue, the surgeon reexamines it to make sure that no disease is present. Dr. Patel has installed allografts that had been in the MGH tissue bank for up to a year. No problems were encountered.

Installing an allograft requires making two more holes to anchor the graft. Since the ACL is positioned in criss-cross fashion, one end of the graft is fixed to the inner part of the patient's leg and the other end to the outer side of the thigh.

"The visualization provided by the arthroscope is all important here," Dr. Patel stressed, "because to do a ligament reconstruction one has to be absolutely precise in placing the allograft."

The surgery is performed under general anesthesia and takes about two or two-and-a-half hours. Afterwards the patient is hospitalized for no more than two days and goes home on crutches with the leg in a cast or splint. The surgeon sees the patient a week later, removes the cast, takes out the stitches, and puts on a lightweight fiberglass cast which the patient must wear for six weeks.

"A gradual exercise program follows," Dr. Patel said. "We do not allow the patient to return to full activities for at least a year because it takes that long for the allograft to obtain the blood supply that it needs from the thigh and the leg and to become stronger."

Since 1984, Dr. Patel has used allograft tendons for arthroscopic ACL reconstruction on 24 patients, including football, basketball, and soccer players, a gymnast, and a professional dancer.

As part of a two- to four-year follow-up, the patients are being called back for tests by independent observers.

Dr. Patel, who is also an Assistant Clinical Professor of Orthopaedic Surgery at Harvard Medical School, said that 12 patients have been reexamined thus far, and all have enjoyed a complete return of leg function and power.

With results thus far of the follow-up, he expressed confidence that the next few years will see many more patients cared for through the allograft approach.

The MGH specialist has lectured on the operative procedure on four continents. A videotape of his technique also was exhibited at an annual meeting of the American Academy of Orthopaedic Surgeons. ■

Two cadaver tendons shown here have been joined to provide greater strength before replacing a torn ligament in a patient's knee.

tin. It is also a principal component of hair and the outer layer of skin (epidermis).

The nails rest on a matrix and a nail bed. The matrix, under the half-moon (lunula) at the lower portion of the nail, contains germinal tissue which promotes the nail's growth, usually at a rate of about an eighth of an inch a month. The bed on which the rest of the nail lies contains the sensory and other organs as well as a rich blood supply.

In addition to strands of tissue which connect the nail to the fingertip, folds of skin around three sides of the nail serve to anchor it. The cuticle seals those folds to the nail plate.

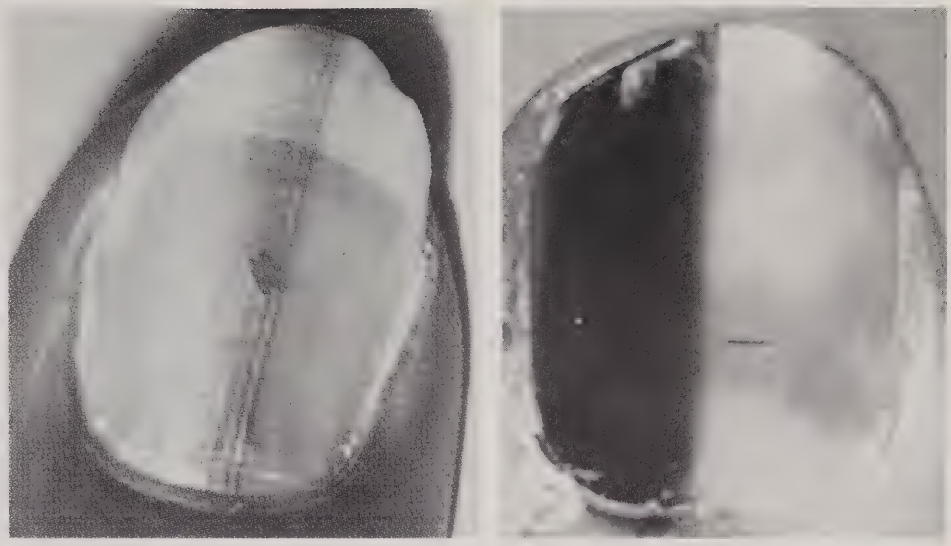
"The maintenance of a normal structure around nails is very important," said Dr. Howard P. Baden, an MGH dermatologist and author of a new medical textbook, *Diseases of the Hair and Nails.* "Infections around nails are quite common. When the cuticle and nail folds are disrupted, foreign materials can penetrate deeply into the tissue surrounding the nail, causing inflammation, swelling, and pus."

Such infection can result in permanent defects in the structure of the nail plate itself.

Dr. Baden said the single most common complaint about fingernails is fragility, e.g., thinness, flaking, breaking, and cracking.

"The fragility," he said, "may result from abuse of the nails, such as biting them; from injudicious cosmetic treatment, from using them too much as tools for scratching or peeling, or from simply wetting and drying them again and again."

Nails are very porous and normally contain about 18 percent water. If the water content increases to 30 percent, the nails become very soft. Conversely, if the water content falls much below the normal level, they tend to become hard and brittle. Thus, excessive wetting and drying may prompt cracking.



Pigmented bands are common under the fingernails of Blacks, left photo, and usually cause no problem but are uncommon among Caucasians and at right cover a malignant melanoma, or tumor.

Sometimes tumors grow around nails. The most common one to affect fingernails is a "mucoid cyst." Containing a viscous fluid, the cyst often presses on a matrix and causes depression in a nail.

"Some physicians inject the cyst with a corticosteroid," said Dr. Baden. "Others try cryosurgery [freezing]. If the problem is particularly difficult, it can be operated on. The nail itself usually does not have to be sacrificed."

No one knows for sure how mucoid cysts arise, but it is believed they are related in most instances to trauma. They rarely affect toenails.

Warts can create fingernail problems. They may develop in nail folds, exert pressure on a matrix, and precipitate flaws in a nail. Warts can be treated by freezing them with liquid nitrogen.

Melanomas can affect both fingernails and toenails. These tumors are seen in Caucasians as pigmentation under the nail plate and/or a pigmented band running longitudinally in a nail.

"The situation presents a dilemma," said Dr. Baden, who is also Professor and Associate Chairman of the Department of Dermatology at Harvard Medical School. "The most likely possibility is that the

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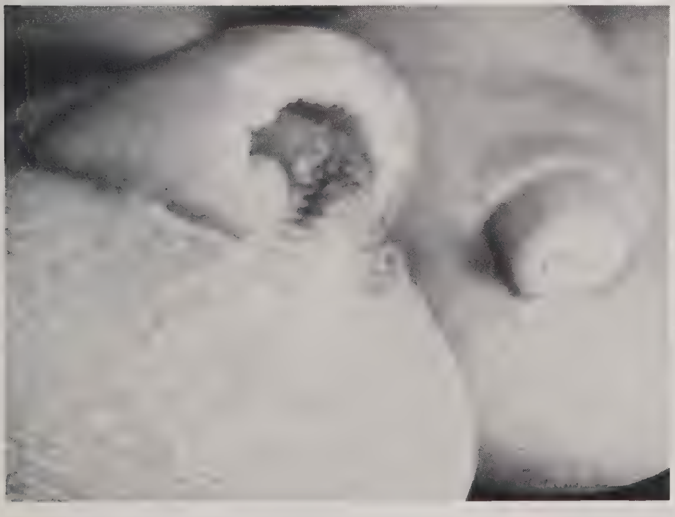

These pincer toenails, a form of ingrown nails, can be extremely painful. They are usually attributed to nail neglect.

For Better Nails

Drs. Howard Baden of dermatology and Robert Scardina of podiatry have listed these important "do's" and "don'ts" in nail care:

- Trim nails with a proper clipper (not a pair of scissors) and only when they are wet, such as after bathing. Cutting nails while dry may crack them.
- A nail should be trimmed close to where it comes off the bed of the toe or finger and should follow the general contour of the digit's tip.
- Avoid excessively long nails which would create a dead space underneath. Foreign material might collect in that space and lead to an infection.
- Be careful not to cut too far back on the sides of a nail, thereby risking an ingrown nail.
- After cutting, always use an emery board to smooth out any nail roughness, and only use the emery board in one direction.
- Never push hard on the cuticle. Damage to this tissue seal could alter the structure of a nail.
- Polishing nails is fine but should not be overdone. ■

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Ingrown Nails Lead Toenail Problems

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brown band stemmed from a mole under the matrix. So do you perform a biopsy [remove some tissue for laboratory study], which would cause a nail defect, or simply follow the condition? Melanomas are cured basically by early surgery."

Another tumor of the fingers and toes that shows up in a nail plate is a glomus tumor. It first appears as a blue dot. This growth within the small blood vessels under a nail is exquisitely painful, especially in cold weather.

Although a melanoma in a toe requires removal of the toe, the glomus can be removed by taking off the nail and then the tumor itself. The toe can be saved.

People often are heard complaining of an ingrown nail, usually the result of cutting too deeply into a side of a nail and leaving a spur that grows into the tissue. These are much more common on the toes than the fingers.

Dr. Robert J. Scardina, Chief of Podiatry at the MGH and of the Podiatry Division at Cambridge Hospital, said that next to corns and calluses podiatrists treat nail problems more than any other condition affecting the foot, and ingrown nails lead the list of nail disorders.

In addition to improper trimming of the toenail, Dr. Scardina said, the wearing of shoes that are too narrow and squeeze the toes can lead to an ingrown nail by pushing tissue into the nail.

When a heavy object falls on a toe, a nail may turn purple or bluish, indicating bleeding underneath. The same condition can occur in running sports, especially on artificial turf. Due to the person's momentum, even though the shoe stops, the foot may keep going and be jammed against the tip of the footwear.

"The treatment consists of putting a small drill hole through the affected nail to relieve the pressure underneath or by removing the nail altogether," said Dr. Scardina, who is also a Clinical Instructor in Orthopaedic Surgery at Harvard Medical School. "If only the nail is removed, a new one will grow in its place."

If the individual decides not to seek professional care, the affected nail will lift off gradually from the nail bed, and a new nail will form. The process usually takes six months or more.

Dr. Scardina emphasized, however, that if the accident injures the nail bed and/or the matrix, the germinal tissue from which the nail comes, a new, but deformed, nail can result.

When an accident lifts a toenail, seriously injuring the tissue underneath, the nail may continue to grow but may never firmly reattach to the nail bed. Since the nail can potentially snag on a bed sheet or stocking and be torn off traumatically, one solution is to remove the nail plate and the matrix permanently.

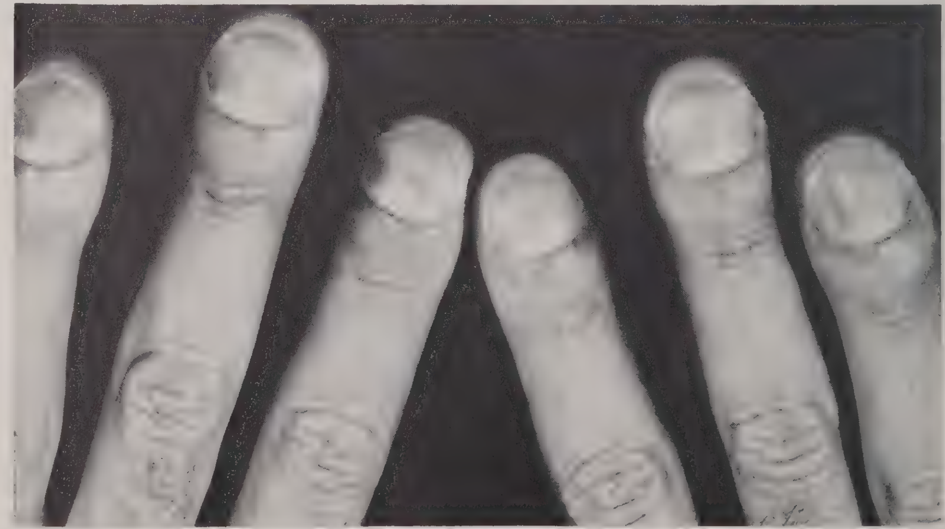
When podiatrists are called to care for the feet of nursing home residents, the specialists sometimes encounter what they describe as "ram's horn" nails.

"Such a nail can be caused by trauma, but more often it is the result of neglect," said Dr. Scardina. "The nail thickens and curves as it grows. It can curve onto itself over and over, taking on the look of a ram's horn."

General fungal infections are a common podiatric problem. The nail thickens and becomes whitish or yellowish, but the condition is usually benign. Unlike in a fingernail, treatment for a fungal infection in a toenail is not very effective. Most patients just cut the toenail back so it will not cause discomfort in shoes.

Nails have often been said to mirror systemic diseases, but Dr. Baden believes that the practice of studying nails in a routine physical examination is less rewarding than it once was.

"Because of improved treatments, many systemic diseases are better controlled today so they no longer affect nails," he said. "Chemotherapy has become a more common cause of nail changes. Although drugs can change the structure of a nail, the side effect is principally a change in the nail's color."■



"Clubbing" of nails may stem from a number of physical disorders and may also be an inherited trait.

MGH News

Massachusetts General Hospital, Boston, Massachusetts Vol. 47 No. 9 December 1988

New Tactics for Attacking Alcohol and Drug Abuse

The MGH has launched a unique outpatient program that enables people with serious drinking or drug problems to obtain intensive care without disturbing healthy aspects of their daily lives.

"It is a major new step in a rehabilitative process that permits a patient to work and continue to care for a family while still engaging in daily treatment," said Dr. David R. Gastfriend, Chief of the West End Group Practice, the MGH's alcohol and drug treatment unit.

Dr. Gastfriend said a tremendous need existed for a service that would provide a transition from initial substance withdrawal in an inpatient rehabilitation program to early recovery in a once-a-week outpatient treatment plan.

"We had a number of patients who clearly needed intensive care but not confinement to a hospital for three or four weeks," the MGH psychiatrist said.

"Drinking can be controlled in a hospital, but the environment is an artificial one. Ideally, sobriety should be established in the patient's own environment."

Paul Duffly, Ph.D., formerly in charge of family treatment at the Boston Veterans Administration Center for Problem Drinking, directs the new MGH program. His staff includes psychiatrists, psychologists, a master's level nurse, and a social worker with training in both individual and group therapy.

To be admitted to the program, patients must have a significant substance abuse

(Continued on Page 4)

On People Who Think They're Special

The story has been told again and again . . . of an incredibly handsome youth in Greek mythology who spurned the attention of girl after girl. Among them was the nymph Echo who became so distraught over his rejection that all but her voice faded away.

This so angered the gods they made the young man fall in love with his own reflection in a pool. When he reached out to embrace his image, he fell into the water and drowned.

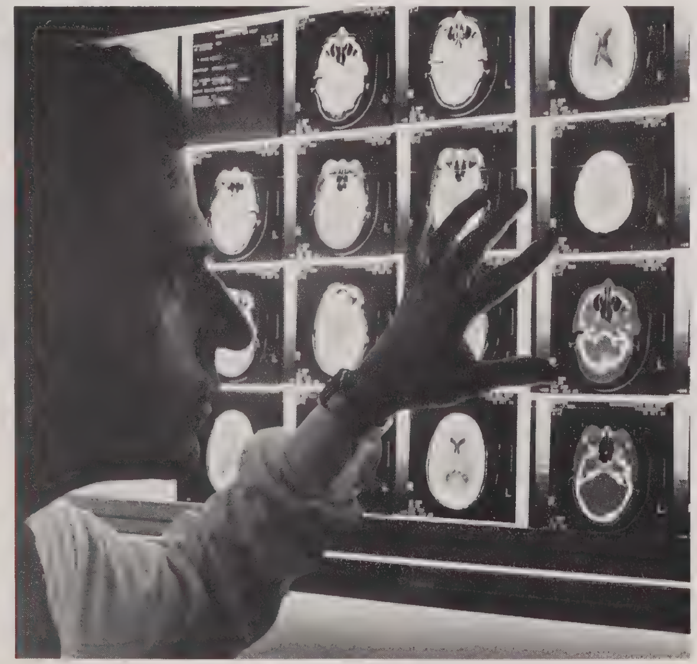
The self-love exhibited by the legendary Narcissus led to the naming of a flower in his memory and to the expression "narcissism" to describe common feelings of people about themselves, although the myth dealt with very abnormal behavior.

"Everybody is narcissistic," said Dr. Eugene V. Beresin, an MGH psychiatrist and Director of Child Psychiatry Residency Training in the MGH Psychiatry Service.

"From the time people are born, they have an emotional investment in themselves. It has to do with such things as formation of an identity, growth and development, feeling comfortable with one's body, experiences of autonomy such as learning how to feed oneself, advances in cognitive development such as pointing out and naming objects, speaking in full sentences, and reading. The mastery of skills, among other developmental achievements, brings great pride in oneself, hence narcissism."

Identification with people whom one idealizes, such as parents, constitutes

(Continued on Page 2)



Dr. Daryl Gress of the MGH Stroke Service hopes a CT scan can help him determine if a patient suffered a stroke or other brain condition. How symptoms sometimes conflict . . . on Page 5

Inside

Page 5 . . . What seems like a stroke but isn't

Page 7 . . . Some good advice on outdoor running in the winter

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EDITORIAL:

The World of Mucho Macho

A Page 7 article offers helpful hints to joggers who continue their sport in northern winters. There is something especially macho about running in all kinds of weather. People who *do* become incredibly compulsive about the ritual. The writer can recall winters when he ran in deep snow (very tiring), on trails entirely covered with glare ice (very dangerous and very stupid), with the temperature as low as 10° below zero Fahrenheit and with wind chill factors of about 30° below zero Fahrenheit (mucho macho).

Neither this editorial nor the Page 7 article is meant to encourage jogging in hazardous winter conditions. Nor is either advocating jogging. Even without the added hazards of winter, jogging presents potential problems like knee ailments. What you gain for your cardiovascular system you may lose for your bones and joints and their constituent members.

A moderate regime of jogging, of course, benefits the cardiovascular system. As with many other things in life, more does not necessarily mean better. Jogging three or four times a week for 20 to 30 minutes seems to provide maximum benefit. Running seven times a week at an hour each time does not appear to add to cardiovascular fitness but *does* add to the risk of injury.

As exercise studies proliferate the evidence begins to mount: a brisk walking regimen of 20 or more minutes three times a week may provide the same degree of cardiovascular benefits without the orthopedic problems and potential cardiovascular risk. If you prefer jogging or running, you might at least consider alternatives for the worst winter weather: using an exercise bicycle, or as the Page 7 story suggests, running on an indoor track, or swimming. And there are other possibilities.

Having once been infected by the determination to jog—no matter what the conditions—the writer understands that some will persist. At the very least, however, heed the good advice detailed on Pages 7 and 8.

Feeling Special

(Continued from Page 1)

another form of narcissistic investment. A little boy of 5 or 6 wants to be like daddy . . . a doctor if daddy is a doctor, or a star athlete if daddy is an avid sports follower.

Later, as children are increasingly capable of separation from their parents, the formation of their own individuality is enhanced by imitating others, incorporating their values and behavior.

High self-esteem and deep confidence in one's capabilities are admirable, but when a person is so caught up with feelings of grandiosity that he becomes destructive of himself and of others, he is often considered to be pathologically narcissistic.

"People with a narcissistic personality disorder often build very successful careers but nevertheless react to criticism with rage, shame, or humiliation," Dr. Beresin said. "They have an exaggerated sense of their own importance. They want to be noticed as special and treated as special.

"They're preoccupied with fantasies of unlimited success, beauty and worth. They exploit other people for their own selfish needs and can be brutally ruthless.

"They may have an absolute lack of empathy. They have no ability to put themselves into another's shoes and thus cannot recognize how others feel."

People from every socioeconomic level and walk of life have developed the narcissistic personality disorder. It also spans all racial and ethnic origins.

How does someone with the problem come to seek professional help? Threat of job loss is one motivating factor. The boss has called the patient in, told him that employees he supervises are upset with his treatment of them, and has served notice that unless he straightens himself out he will have to leave.

There are other kinds of coercion. The patient has been arrested for some kind of antisocial offense, perhaps in conjunction with alcoholism or substance abuse, and has been ordered by a court to seek psychiatric attention.

Or a wife or girl friend may have warned, "I've had it with your selfishness.

Photographs: Pages 1, 4, 5 (lower), 8, Myron Daniels; pp. 5 (upper), 6, courtesy of Dr. Robert Novelline

Illustrations: Page 3, courtesy of World Book; p. 7, courtesy of Dr. Harvey Simon

Unless you change, you can consider our relationship over."

Dr. Beresin, who is also an Instructor in Psychiatry at Harvard Medical School, told of a teacher with a narcissistic personality disorder who found it difficult to empathize with his students and tried to deal with this by changing his profession.

Although he became very successful in his new career, he alienated subordinates and even drove off friends because, they complained, he was selfish, insensitive, demanding and a mister know-it-all.

Pressed to seek professional help, the former teacher consulted with Dr. Beresin.

"Early on, he did not comprehend the full scope of his problems," the MGH psychiatrist said, "but his treatment progressed tremendously, although very slowly, over time. Gradually, he came to understand his profound low self-esteem giving rise to defensive grandiosity, his distrust of others, exquisite sensitivity to criticism and rejection, and illusion of self-sufficiency as a defense against personal relationships, which were perceived as dangerous. As his interpersonal skills gradually improved, he rose to a vice presidency in his company. And he is now happily married, with a baby on the way."

The legendary Narcissus admires his reflection at a pool.

During his treatment, it became clear that the former teacher's arrogance and efforts to hold people at bay really was an attempt to cover deep-seated feelings of vulnerability and fears of impending humiliation and rejection.

The key to the therapy was to provide the patient with emotional experiences that he never had before. This was achieved by establishing a doctor–patient relationship through which the patient could understand his internal conflicts, defenses, and interpersonal behavior, which originated from the relationship with his parents.

After winning with much empathy the patient's admiration and trust, Dr. Beresin induced him to see himself through the doctor; mirroring, it is called. By fostering a sense of being known and appreciated, the therapist gained a way into the patient's inner world.

When inevitable empathic failures occurred, the patient was able to continue to trust the therapist and accept his limitations. This trust also allowed Dr. Beresin to confront the patient and interpret his aggression, envy, and loneliness.

"If a child believes that his parents know, admire, and appreciate him, as well as understand his abilities and weaknesses, then he also knows that at times his parents will not meet his expectations but will make up for it," Dr. Beresin said. "If the child, on the other hand, perceives himself as not admired, respected, or appreciated, he is very apt to counter his feelings of rejection, anger, and low self-esteem by taking an opposite tack, saying, 'I don't need anybody else.'"

In therapy, Dr. Beresin was able to show the patient that he had been living in a cocoon and really longed for the dependent, empathic relationship he never had. Slowly he saw what he had missed, understood the extent of his rage toward people whom he loved and needed, and thereby developed a more realistic view of himself and others. For the first time, he began to feel complete.

Additional emotional features of narcissistic personality disorder and clinical techniques are described by another psychiatrist, Dr. Gerald Adler, who is Director of Medical Student Education in Psychiatry at the MGH.

Some therapists believe, Dr. Adler said, that in the person with a narcissistic personality disorder the idealization of parents actually hides feelings of anger and envy that the parents have so much. The treatment focuses directly on the self-sufficiency defenses, e.g., "This doesn't bother me, I'm doing just fine. Who needs you?"

Dr. Adler spoke of a patient who moved from one job to another every three to six months. He was arrogant and difficult to deal with, frequently ridiculing his boss, and had been referred to therapy many times. He finally went because he began to ask himself what he was doing wrong.

In therapy, the patient kept his doctor at a distance, claiming that psychiatric care was not what he needed. He devalued the therapist's intellect.

"The therapist took the position that this was actually envy of him and what he had," Dr. Adler said. "By focusing on this over a period of months, the doctor finally got his patient to acknowledge that he was hostile because he was envious. The patient could now begin to see that these attitudes were self-destructive."

Dr. Adler, who is also a Lecturer in Psychiatry at Harvard Medical School, said there is nothing wrong with feeling able to do something as well or better than someone else, to value one's work as special, unique, and creative.

"But if people are healthy," Dr. Adler said, "they will care how they interact with each other. They will not be like the opera singer who storms off the stage, telling the director, 'I don't want to hear any more from you. If I can't do it my way, I'm quitting!' They will listen instead to what others think."

No one knows what percentage of the population is affected with an abnormal narcissistic personality. Dr. Beresin believes that men are more frequently diagnosed than women, in part because of their respective roles in society.

Women are taught to be attractive, attentive to others, and nurturing, he said. Men are taught, on the other hand, to be rough and ready, to accept challenges.

In treating narcissistic personality disorder, one particular technique may attract a more favorable response from some patients than another.

"The therapist has to decide which model is best for the patient," Dr. Adler said, "and also which one he, as the therapist, is most compatible with."■

Dr. David Gastfriend meets with a prospective enrollee in his new alcohol and drug abuse therapy program.

Nightly Therapy for Substance Abuses

(Continued from Page 1)

problem. They usually have failed less intensive outpatient treatment. Some may have completed detoxification in an inpatient unit and received other medical care. Patients can be considered for direct enrollment in the new program if they have no current physical dependencies.

Extending from 4 to 12 weeks depending on need, the program requires patients to attend up to five, two-hour, evening sessions a week at the quarters of the West End Group Practice in the MGH's Wang Ambulatory Care Center. Attendance at each group meeting is limited to 8 to 12 patients.

The group approach offers the patient a chance to see that he or she is not alone with the illness. Because of a flexible entry policy, the groups include patients at various stages of therapy. Thus, by observing and listening to others, newer patients quickly develop a sense of the kind of recovery possible for them.

The program educates patients about chemical dependency and offers concrete techniques for coping with postwithdrawal symptoms, cravings, and tension. Each patient is also assisted in developing a personal plan for daily living, including work, recreation, rest, and nutrition.

The patients keep diaries to facilitate compliance with the plan. They jot down notes on their day's events, even any urges to drink or use drugs. Such instances can be discussed later with their therapist.

On one evening each week, patients are expected to be accompanied to a session by a relative or friend. These guests learn about the physical and psychological effects of addiction, how to recognize the difference between the person and the disease, and gain other knowledge they can use to help support the patient during the recovery period.

The new program, the concept of which was developed by Dr. Gastfriend, is just one of many types offered by the West End Group Practice. Some call for meetings one evening weekly. Both men and women attend. Some groups attract younger people, some older. Some patients have been sober for years. Some are still struggling.

Dr. Gastfriend said that his team tries to match patients with groups that are dealing with issues the patients need to actively confront. Later they are moved into another kind of professional treatment, such as learning self-help measures.

Representatives of Alcoholics Anonymous speak frequently to patients of the West End Group Practice to help those with alcohol problems develop a network of sober friends.

Not only is the MGH unit licensed to treat and rehabilitate alcohol and drug abusers, it is also in a position to offer free care to patients who qualify under a contract with the Commonwealth of Massachusetts.

Dr. Gastfriend, who is also an Assistant Professor of Psychiatry at Harvard Medical School, said both alcohol and other substance abuse can be dealt with at the same session.

"The effects of drinking or drug use on the brain and body are in many respects remarkably similar," he said. "In addition, many people who are dependent on chemical substances have feelings of guilt. So a patient at a group session stands to benefit from hearing of someone else's experience even if it involves a different chemical."

Dr. Gastfriend said his team has frequently encountered patients who mixed drugs and alcohol.

"Sometimes after using cocaine," he said, "they turned to alcohol to help them get to sleep. Soon a dependence on both cocaine and alcohol developed.

"People may then turn to diazepam, one of today's most prescribed antianxiety medications, to help with alcohol withdrawal. The combination of diazepam and alcohol can make a person very sick. Patients may also smoke marijuana on the days when they are not using cocaine."

When heroin addicts cannot get enough of that drug, they sometimes try to boost the effect of a small amount by adding diazepam.

Some people seek help in overcoming addiction to the pain killers Percodan and Percocet. These are sometimes obtained from physicians who are unaware that others are also prescribing the drugs.

Dr. Gastfriend and his colleagues have treated patients who were very careful to avoid alcohol but who saw nothing wrong with the weekend use of cocaine. Before they knew it, they were "free-basing" the drug, chemically converting it into a powder that creates the effect of almost taking it intravenously, or were turning to "crack," an inexpensive crystalline form of cocaine that is just as potent.

People with cocaine problems often seek help because they cannot buy it anymore. They have gone broke.

"We have had patients who spent up to $30,000 on cocaine in just a couple of months," Dr. Gastfriend said. "We have had people lose ownership of entire companies because of the drug habit."

A physician will sometimes refer a patient to the unit after discovering that excessive alcohol use has affected the liver. The unit's task is to educate the patient that drinking can harm not only the liver but the brain as well, reducing the capacity to think and make sensible judgments.

Dr. Gastfriend's group is occasionally called on to treat someone who has attempted suicide. He told of one young man from a close-knit, religious family who lived at home but felt his life was stagnating. Although sincere, well-

Some Stroke Signs Can Also Indicate Other Maladies

While preparing to give a scheduled address in an auditorium, a middle-aged man suddenly saw shining lights before his eyes. In minutes, he became totally blind. Although unable to read his notes, the speaker insisted on being guided to the podium and went ahead with his talk. Three hours later, his vision returned as if nothing had happened.

While eating lunch, a 51-year-old man was stricken with paralysis of his left arm and hand, numbness of the left side of his face, and a slowing of his speech. Within 15 minutes, however, all function returned.

In still another incident, a woman aged 47 developed trouble speaking. After five minutes, in quick succession she lost all feeling in her left hand, her tongue, and her right hand. All symptoms disappeared after 20 minutes.

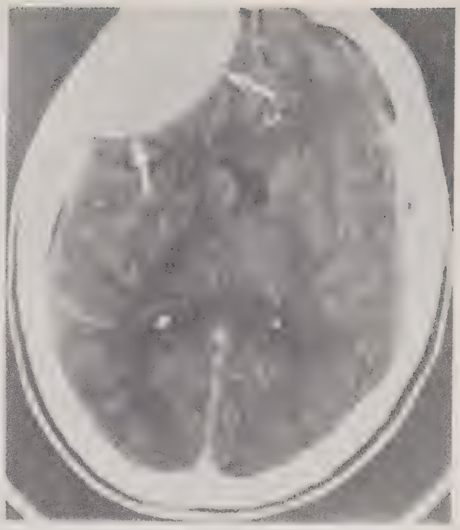
In each instance, the symptoms resembled a transient cerebral ischemic attack (TIA), or warning signal of an impending stroke (damage to the brain from a ruptured or blocked artery), the third leading cause of death in the United States after heart disease and cancer.

The spells, however, were not signs of developing cerebrovascular accidents, as strokes are also called. Instead, the patients were diagnosed as having the neurological accompaniments of migraine, a headache which sometimes masquerades as a stroke but is usually benign.

A migraine attack is only one of a variety of disorders which can be mistaken for a stroke. Each year, strokes befall up to 500,000 Americans, 35 percent of them fatally.

A migraine is commonly characterized by throbbing pain which is thought to arise from a squeezing or stretching of blood vessels in the head. The attack is often accompanied by nausea.

An attack may occur not only during stressful situations but even afterwards such as during the first day of a vacation or when a formal party has ended.



This CT brain scan shows a mass of blood (See arrows) which could be mistaken for a stroke. A blow may have caused the bleeding.

Dr. J. Philip Kistler, an MGH neurologist who directs the hospital's Stroke Service, said that no one really understands the biological mechanisms of migraine and why it is sometimes associated with

(Continued on Page 6)

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behaved, and a good worker, he felt hopeless about his future and began drinking beer regularly.

He thought that drinking beer was okay and could not cause a dependency, but he found himself drinking increasing amounts. He was looking for an effect, a feeling of relaxation and independence, a sense that he was in charge of his life.

Instead, the young man's liver began breaking down the beer more and more rapidly. He developed a tolerance for it and as he drank more to achieve his desired effect he developed headaches, nausea, and fatigue. He became increasingly irritable and depressed. An antidepressant medication was prescribed for him but one day he decided to take all of the pills at once. Fortunately, help reached him in time.

"It's unlikely that a patient who is not motivated to overcome his alcohol or drug habit will want to work with us," Dr. Gastfriend said, "but we are not policemen. Our purpose is only to assist people in achieving a sober life. We want them to build a secure repertoire of healthy behaviors so that they won't turn back to self-destructive habits."

In addition to its treatment programs, the West End Group Practice has several research programs under way.

"It has been known for years that prolonged use of alcohol impairs the brain," Dr. Gastfriend said. "Alcohol can lead to short-term memory loss, lack of motor coordination, and a lessened ability to think abstractly. We don't know whether short-term excessive drinking can produce the same cognitive impairments. We're looking for the answer to that."

Another study looks into the effect of drugs on the brain. "This issue has not been studied adequately," the MGH physician said. "With many people using drugs in combination today, it is important to know what cognitive impairments they can impose."

A third research project follows federal investigations which suggest that two enzymes function differently in the blood of alcoholics than in nonproblem drinkers. The normal task of one enzyme is to break down some of the brain's neurotransmitters, which relay signals.

"The aberrant enzymes may just be markers for the presence of alcoholism," Dr. Gastfriend said, "but it's possible they are genetic markers, indicating that even before the alcoholic began drinking he may have been predisposed to the disease.

"If that proves to be the case, then we might be able to tell whether the children of an alcoholic are also vulnerable to the same illness."■

Dr. Paul Duffly conducts a group therapy session.

Diagnosing Stroke Can Entail Many Tests

(Continued from Page 5)

such symptoms as loss of vision, numbness, paralysis, and difficulties with speech.

Virtually all of the symptoms are temporary. One of the most common migrainous developments that is sometimes confused as a stroke sign, the appearance of bright sparks or dazzling zigzag lines in the visual field, may last 20 to 40 minutes.

"An angiogram [an X ray of blood vessels with a contrast agent to make them show up on film] usually will look normal when the patient's problem is a migraine," Dr. Kistler said.

Among people over the age of 50, the population most susceptible to strokes, the diagnosis of migraine with neurological accompaniment is made even more difficult because half of the patients give no prior history of headaches.

Still, the patient's account of symptoms is fundamental in determining a diagnosis because the attending physician knows from experience what the details probably mean, and he coordinates this information with the results of a thorough physical examination, including neurological and laboratory tests.

The tests would include a check of cranial nerves, motor power sensation, reflexes, coordination, stance, and gait. A CT (computed tomography) exam would also be in order since this test can show or rule out a brain tumor as well as a collection of blood in the head (a subdural or epidural hematoma), which could have been caused by a severe blow.

Dr. Kistler said that both of these conditions can lead to a variety of weaknesses mimicking a stroke. Symptoms of the tumor often hinge on where in the brain the tumor is situated. The hematoma might produce a severe headache or a weakness on one side of the body.

In the continuing effort to decide whether a stroke has occurred, the carotid arteries, the major neck vessels serving the brain, will be checked noninvasively for the possibility of a blockage.

That might be followed by a transcranial Doppler test, also noninvasive, which could provide important data on the condition of other blood vessels in the brain.

The patient's heart is also carefully examined for possible signs of a disease, such as uncoordinated quivering of the upper chamber (atrial fibrillation), or a hole in a chamber wall (septal defect), which may have led to an embolus, or floating clot. Such a clot could travel through the blood stream from the heart to the brain and precipitate a stroke.

Dr. Kistler said that if after all of these tests the diagnosis remains in doubt, the patient might then undergo an angiogram. "We don't take an angiogram lightly," he said, "because it does present an element of risk for the patient."

Such a test, however, can reveal the presence in the brain of an abnormal mass or tangle of blood vessels which can disrupt cerebral function.

Called an arteriovenous malformation (AVM), the disorder can cause loss of memory and a variety of other disturbances such as loss of control over limb movements.

The abnormal vessels, which people may have had unknowingly for years, can rupture and cause a fatal stroke. But often AVMs are discovered in time and respond favorably to surgery or, if inoperable, to proton beam therapy (*MGH News*, June–August 1979).

Among other conditions which can simulate a stroke is multiple sclerosis, a destruction of nerve fibers in the central nervous system. The malady can come on abruptly, causing lack of muscular coordination.

"The patient's history provides the best clues to the true diagnosis," said Dr. Kistler, who is also Associate Professor of Neurology at Harvard Medical School. "MS patients, for one thing, are usually younger than those individuals who are most susceptible to a stroke."

Dizziness commonly brings thoughts of a possible stroke. An older person who experiences dizziness for the first time often is rushed to a hospital emergency room, but the problem frequently turns out to be a degeneration of the cranial nerve governing hearing.

Before anyone thought of testing the hearing nerve, angiography was often prescribed for patients who complained of severe dizziness.

Many physicians treat the dizziness by giving a medication such as meclizine to calm or sedate the hearing nerve.

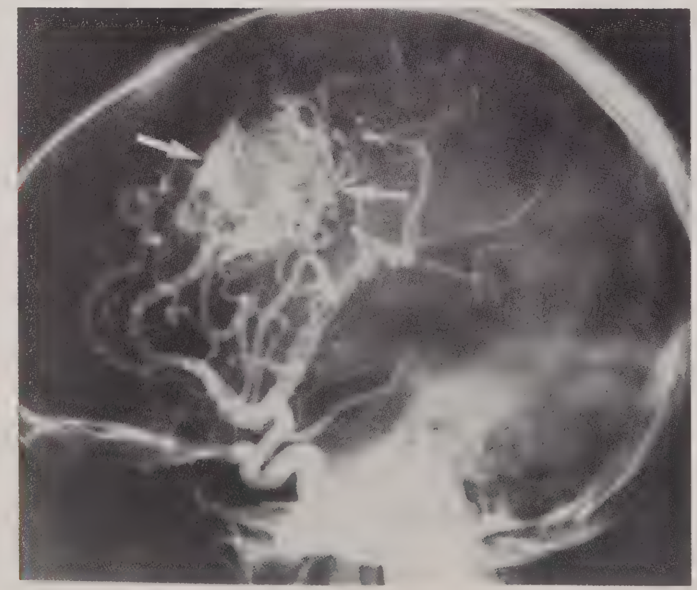
If an older person faints, some may describe the condition as a "little stroke." It rarely is. The attack could have been due to a slight seizure, an interruption of electrical activity in the brain; abnormally low blood pressure, or a heart disorder.

It is very common to think of a "little stroke" in someone whose memory is fading. The malady might really be the onset of Alzheimer's disease, an abnormal accumulation of fibrous material within nerve cells leading to senility (*MGH News*, December 1980 and September 1983).

Another disorder that causes degeneration of brain cells and is confused with stroke is Pick's disease. For the first year or two, the illness may affect speech. Then other symptoms set in. As with Alzheimer's disease, no effective treatment is available.

Although a number of conditions resemble a stroke but are not, physicians take care not to render a definitive judgment until every bit of evidence is in.

On occasion, when a severe headache develops and the first test results point to a migraine or a bout with the flu, the condition abruptly changes a few days later and proves to be a ruptured aneurysm (ballooning of an artery). In this situa-



A tangle of blood vessels in the brain, as shown in this angiogram (See arrows), may lead to symptoms of a stroke, but timely intervention can block an actual stroke.

Reducing the Perils Of Outdoor Running In the Wintertime

Someone once said, "I have two fine doctors – my right leg, and my left."

It has been estimated that some 20 million Americans jog or run to become or stay physically fit.

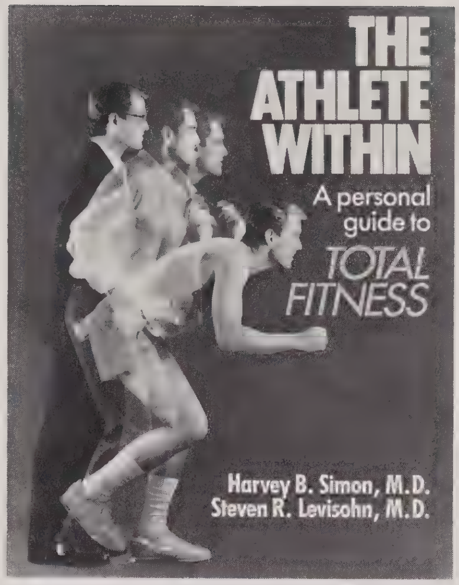
Dedicated runners are truly athletes for all seasons, but when winter approaches runners and joggers must recognize that the rules of their game become more stringent. As in other wintertime sports such as skiing and ice skating, certain special precautions are imperative.

"Warmups before running and cool-downs afterwards are doubly important in the winter," said Dr. Harvey B. Simon, who with Dr. Steven R. Levisohn, also of the MGH, coauthored *The Athlete Within – A Personal Guide to Total Fitness,* published last year by Little Brown and Company.

"A person's joints and muscles are tighter and stiffer when exposed to the cold. The chance of injury, therefore, increases.

"Stretching exercises and calisthenics for ten minutes before running warm up the muscles and joints, and thereby reduce the chance of strains, sprains, and other injuries. Low-level aerobics also warm the heart and circulation, lessening the risk of unexpected heart problems, such as irregular beats [arrhythmias].

"Five to ten minutes spent later cooling down, such as by stretching, walking, or jogging slowly, allow the accelerated heart rate to gradually return to normal and the muscles and tendons to stretch out."



Written by two MGH physicians, The Athlete Within *offers sound advice for year-round outdoor exercising.*

To the unprepared, cold weather can pose the threat of frostbite, exposure, and low body temperatures (hypothermia).

In their book, which discusses a wide range of sports and their roles in a physical fitness program, Drs. Simon and Levisohn cautioned readers who are particularly partial to running or jogging:

"Cold temperatures are the greatest risk factor, but wind, dehydration, lack of proper equipment, and especially skin moisture add to the risk. Fatigue, injury, or anything else that forces you to slow down or stop exercising before you're safely back home can be particularly dangerous."

Dr. Simon advised in an interview that it is best to try to run during the warmer times of the day, if possible, rather than during the very early morning or very late evening when temperatures are lower.

"If a person is going for a lengthy run, it's advisable to have a companion," he added. "And it's better to go out with the wind in one's face so that on returning, when one may be tired and slowing down, the wind is at the back providing help."

While most people find that exercising in cold air is invigorating. Dr. Levisohn told *MGH News* that some others find themselves coughing, wheezing, or just short of breath.

"This subset of the population may have exercise-induced asthma," he said. "Simple medications are available to control a mild problem. If it is severe, the outdoor enthusiast may have to choose an indoor sport for the winter. Swimming would be a good choice."

In their book, the two MGH internists, who are also on the faculty of Harvard Medical School, stressed the importance of staying hydrated during outdoor exercise in cold weather.

People fail to realize that they lose a lot of fluid for two reasons: When they breathe hard in dry, cold air, fluid is lost through the lungs as water vapor. And even though the air is cold, the body sweats during prolonged exertion. Drinking almost any liquid can counteract the fluid loss.

Although various sports have their own particular clothing requirements, the general practice in winter leans toward multiple layers of thin, flexible outfits.

A person who feels warm can shed or unzip a layer or if cold can add or zip up a layer.

Drs. Simon and Levisohn said they are particularly fond of a new synthetic fabric called polypropylene for the innermost layer because, in addition to offering warmth, it is very lightweight, flexible, and comfortable.

"It has a marvelous ability to wick moisture away from the body," the authors added in their book. "Wool is also a good insulator, but is itchy and less comfortable.

"Cotton longjohns tend to get soggy with perspiration and are therefore much less comfortable and much less effective. Silk longjohns are coming back into fashion for some skiers; elegance notwithstanding, silk does retain a moderate amount of moisture and is therefore less desirable than polypropylene for active winter sports."

Synthetics are also gaining favor over traditional wool for the outer layer of

(Concluded on Page 8)

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tion, what looked every bit like a headache proved to be a stroke after all.

Similarly, a patient may be admitted with an extremely severe headache and shortly afterward develop a stroke, with some form of paralysis or speech problem resulting. An angiogram might then reveal the patient's brain arteries in remarkable spasm.

Dr. Kistler and colleagues recently described this condition in the scientific journal *Stroke.* The malady, which they have called Reversible Cerebral Segmental Vasoconstriction, is uncommon and usually affects younger people. Most are women.

The outlook for these patients is said to be good. Physicians often prescribe cortisone to try to eliminate the spasm.

Ironically, the medical profession today is capable of preventing almost all strokes. In the last 20 years, the treatment of high blood pressure alone, starting at its onset, has reduced the incidence of strokes by about 50 percent in America.

The National Heart, Lung, and Blood Institute has reported that cigarette smokers are two to three times more likely than nonsmokers to suffer strokes but can cut the risk by more than half by eliminating the habit.

And more and more Americans have become diet conscious. By eating properly, they can not only stay trim but, through a lowering of cholesterol intake, can prevent atherosclerosis, or hardening of the arteries . . . another cause of stroke.■

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Winter Runners Must Retain Body Warmth

(Concluded from Page 7)

garments. One particular synthetic used for coating fabrics is lightweight, water-repellant, wind-resistant, and flexible. In addition, it has many pores that allow the body to breathe. Thus, sweat quickly evaporates, and the person feels drier and warmer.

Dr. Simon urged special cautions to protect the hands, feet, and head against the cold. "A mask, such as those worn by skiers, can help to protect the face," he said, "or the runner can apply a thin layer of petroleum jelly to guard exposed areas.

"Obviously it's best to avoid bitter cold conditions, with wind-chill factors lowering temperatures below zero. But unless there is a medical problem, one can run safely in amazingly cold weather with appropriate clothing and precautions."

A runner or jogger has to exercise great care during wet road conditions in the wintertime.

"Moisture can be very rough," said Dr. Levisohn. "It is actually as great a hazard in the winter as the cold itself. Running in the rain can be fun at 60 degrees, and only mildly uncomfortable at 45, but at 32 degrees it can be life-threatening.

"The runner's clothing will lose its insulating properties when it's wet, and the body will lose heat very rapidly. If the individual is out for very long in the damp cold, frostbite can develop."

Frostbite begins with a stinging or aching sensation, then progresses to a numbness. The lack of pain can lead to a false feeling that all is well. Actually, it is a warning signal.

The areas most often affected—the fingers, toes, ears, or nose—will take on a whitish, waxy appearance. The stricken person should get out of the cold promptly and rewarm the frostbitten tissues in water of about 105 degrees Fahrenheit.

Drs. Simon and Levisohn both warned that rewarming followed by a quick return to the cold temperatures would lead to even more serious tissue damage. Thus, the rewarming should be delayed until any risk of refreezing has passed.

If injury, improper clothing, or exhaustion causes a runner to stop exercising before he can reach a place of warmth, hypothermia may set in. Even if the weather is temperate, wind chill can lead to hypothermia.

The symptoms develop gradually: extreme fatigue, mental confusion, and lack of coordination. Speech may become slurred and judgment impaired.

Unless treatment is given promptly, shivering occurs and the muscles turn stiff. Shock, a plunge of blood pressure, follows together with an onset of heart irregularities.

Treatment of hypothermia requires removing the patient to a shelter as soon as possible and providing warm, dry clothing. In mild instances, the patient should be given warm fluids and encouraged to activate his muscles. The same first-aid measures apply for mild episodes of exposure.

In severe hypothermia, rewarming with blankets and/or sleeping bags is very important, and the patient should be evacuated to a hospital as quickly as possible.

Dr. Simon said that icy road surfaces rank high on the list of dangers to runners and joggers. "Unlike packed snow which is a reasonable surface, ice is very hazardous," he said. "Ideally, a runner should pick a route that is both free from vehicular traffic and pretty much cleared."

If the runner does decide to travel on hard-packed snow, the use of running shoes with waffled or studded soles is advised for best traction. If snow and traffic combine to produce hazardous conditions, the athlete might then look for an indoor track to pursue his pastime until better outdoor conditions return.

The Athlete Within points to advice given more than a century ago by Edward Stanley, the 15th Earl of Derby:

"Those who think they have not time for bodily exercise will sooner or later have to find time for illness."■

Lower temperatures signalling the approach of winter fail to keep Mrs. Harvey Simon from her regular exercise schedule.

MGH
News

MASSACHUSETTS GENERAL HOSPITAL, BOSTON, MASSACHUSETTS Vol. 48 No. 1 January–February 1989

MGH Studies Shed Light on Critical Infant Disease

A severe disease of newborns which used to take the lives of four of every five babies it struck appears to be yielding to research being conducted in an MGH laboratory.

Dr. W. Allan Walker, Chief of the Combined Program in Pediatric Gastroenterology and Nutrition at the MGH and at Children's Hospital in Boston, believes his group has found both the cause of the disease, called necrotizing enterocolitis (NEC), as well as a way to prevent it.

The disorder strikes between 2,000 and 4,000 newborns in the United States each year and is the most common acquired gastrointestinal emergency in neonatal intensive care units (NICUs).

The malady affects one to five percent of newborns admitted to such specialized units. Of the babies stricken, usually between the third and 10th day of life, 80 to 90 percent are born prematurely and consequently have a very low birth weight.

Known to medicine for about 25 years, the disease has already responded dramatically to two measures. Treatments with antibiotics and a conversion from feedings by mouth to intravenous feedings have helped to lower the death toll from 80 percent to 20 to 40 percent. NEC is very uncommon among infants who have never been fed by mouth.

Now there is also hope that when a pregnant woman is judged to be at high risk of delivering a baby who will develop NEC, a low dose of steroids can be

(Continued on Page 2)

Tighter Reins on Excess Cholesterol

An intensive new drive is being waged to finally put cholesterol in its place.

Several years ago, appeals for Americans to reduce blood cholesterol levels and avoid an increased risk of coronary artery disease fell on many deaf ears. No one had proved that lowering cholesterol levels would make any difference.

Since then, abundant evidence has shown that avoidance of an excess of this lipid or fatlike material in the blood can indeed make a difference.

The first major study, published in 1984, found that cholesterol reduction with a drug called cholestyramine and a low-fat, low-cholesterol diet lessened the incidence of coronary disease by about 20 percent.

In subsequent research, a group of patients underwent angiography (the X raying of blood vessels with the use of contrast material to make them visible on film) to document that they had coronary disease; that is, coronary arteries at least partly blocked by fatty substances. They then received diet and drug therapy to lower their cholesterol.

After two years, angiograms again were obtained on the coronary arteries. The findings showed that in patients who had dramatic decreases in cholesterol, the extent of coronary disease also lessened.

In trying to raise public awareness of the association between high cholesterol in the blood and heart disease, federal health officials also established more stringent guidelines for treatment.

In the past, as people advanced in age they were permitted higher cholesterol levels before they were deemed at risk for heart disease. Men in general were seen as higher risks than women.

Today, all adults come under the same rules. A total cholesterol level at or below 200 mg/dl (milligrams per deciliter) is desirable. Once cholesterol climbs above 200, the risk of it clogging the heart's arteries, causing potentially fatal atherosclerosis, mounts more rapidly.

A total cholesterol count between 200 and 239 is now considered borderline-high for all adults. Above 240 is high.

"A person with a cholesterol level of 300 has about four times the chance of a heart attack as somebody with a cholesterol of 200," said Dr. Mason W. Freeman, an endocrinologist and Director of the MGH's Lipid Clinic.

Dr. Freeman estimated that a quarter of America's adults over age 40 have total

(Continued on Page 4)

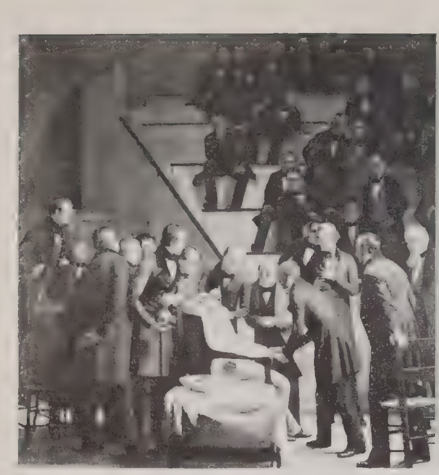
CHEEZ-IT
Promise

At a class on "Eating for the Health of It," Dietitian Mary Kay Fox offers advice on evaluating food products.

Inside

Page 5 . . . Rethinking how the brain controls language

Page 7 . . . Tuberculosis is again a threat in many cities.



MGH *News*

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EDITORIAL:

The Fall and Rise of Tuberculosis

Once a scourge, tuberculosis in the United States has, with the increasing effectiveness of treatment, become something less than a household fear. A page 7 article explains that . . . and also why this disease is making a comeback. And in that resurrection comes a warning. Never take anything in life—not even the predicted demise of a waning disease—for granted. Only when the last case of an infectious disease has been chronicled can its threat be past.

Smallpox is an example of a once feared disease that has disappeared. It took an effective vaccine capable of preventing the occurrence and worldwide cooperation of public health officials to provide widespread use of that vaccine.

Measles and polio are infectious ailments for which there are effective vaccines. While both, especially polio, have waned in the United States since the advent of the vaccines, polio has not quite been eradicated even in this country. Measles remains much farther from eradication while polio may be only a whisker away. Because of world-wide travel, it is difficult to vanquish even these viruses without near universal vaccination in America.

To launch global campaigns against such diseases would take MOM (motivation, organization, and money). It requires education to motivate. Multinational campaigns necessitate a will to work together. In one sense money is the easiest component. In the long run it is much less expensive to eliminate a disease from this globe than to treat hundreds of thousands of patients. The productive returns from a healthy work force also more than balance the original cost.

Organization can be difficult in third world countries where so many residents live in remote rural areas. Nevertheless it is organization that holds the most promise. To achieve the requisite level of planning to attack even a few diseases will demand unprecedented cooperation. Even traditionally enemy nations with a common border may have to at least passively cooperate against universal viral enemies. In a utopian dream one might envision an international Peace Corps to battle the common foe of pestilence. This might emerge from a reconstituted World Health Organization using smallpox as the model. Maybe medicine could ultimately become—along with music and the arts—a force to help break down barriers. Perhaps that is hoping too much. Yet . . . some day?

Infant Disease

(Continued from Page 1)

given to the mother to prevent the disease.

Dr. Walker described necrotizing enterocolitis as an inflammatory GI process whose symptoms include bloody diarrhea, abdominal distention, and eventual perforation of the bowel.

The disease primarily strikes preemies because the capacity of the intestines to handle bacteria is different in the neonate, and particularly so in the prematurely born baby.

Most babies with NEC are vulnerable from the very start with an immature intestinal wall, a slower blood flow through the intestines, decreased stomach acidity, and inadequate GI muscular movements and mucous secretions.

These weaknesses prevent the elimination of any bacteria that enter the intestines. Bottle feedings provide a major source for such entry.

"We live in a very contaminated environment," said Dr. Walker. "Infants fed standard formulas are exposed to different, more disease-causing bacteria than breast-fed infants. The nature of the infant's feeding determines to a large extent how bacteria will colonize in the intestine."

He told of studies in his MGH Mucosal Immunology Laboratory which showed that bacteria generally attach to the intestinal surface by linking with sugars that have already attached to molecules on the surface.

"Our studies have shown," he said, "that the sugars present in the newborn and in the premature intestine are different from those in the mature intestine and allow greater pathologic bacterial adherence and colonization."

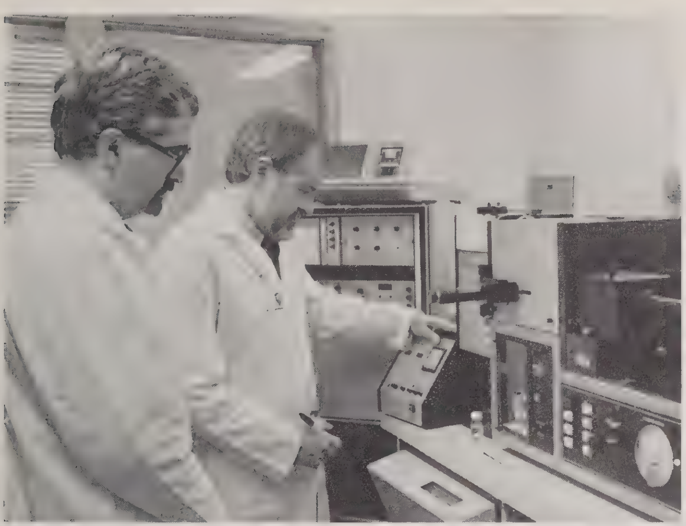
If the bacteria penetrated the intestinal wall and entered the abdominal cavity, the infant could die very quickly from sepsis and peritonitis.

Steroids entered the picture fortuitously several years ago when members of a multicentered study sought to learn if low doses of corticosteroids could prevent hyaline membrane disease in newborns.

Also known as respiratory distress syndrome, hyaline membrane disease causes

Photographs: Pages 1, 3, 4 (lower), 5, 7 (upper), 8, Myron Daniels; p. 7 (lower), courtesy of MGH Radiology Department

Drawings: Page 4 (upper), courtesy of MGH Dietetics Department; p. 6, courtesy of Dr. David Caplan



Drs. W. Allan Walker, right, and Eduardo Schiffrin at a flow cytometer which they use to sort intestinal cells for study in the Mucosal Immunology Laboratory

a baby's lungs to collapse with each breath.

The study, which did not involve the MGH, found that steroids had no effect on the disease, but that in the same babies whose mothers had received the injections there was a remarkable decrease in the expected incidence of necrotizing enterocolitis. Nobody knew why this was so.

"This research dovetailed with animal studies being done in our lab for other reasons," Dr. Walker said. "We were looking at sugars being placed on molecules on the intestinal surface. What we found was that the pattern of the neonate became more like a mature animal after the pregnant animal was given a steroid injection.

"We then said if that is true, coupled with the knowledge that bacteria required these molecules for attachment, we should take a closer look at bacterial adherence."

Dr. Walker worked in collaboration with Dr. Esther Jacobowitz Israel, who also holds a pediatric appointment at both MGH and Children's, and with Dr. Eduardo Schiffrin, a visiting pathologist from a research institute in Buenos Aires who is intrigued by the problem of inflammatory bowel disease and infections of the intestines.

Using laboratory animals, the three researchers showed first that they could produce NEC in the infant animals and, in virtually all of them, could prevent the expression of the disease by giving steroids.

In the immature intestine of animals with NEC, the investigators also found an increased penetration of bacteria into the bowel wall and into the abdominal circulation.

"When we gave steroids to pregnant animal mothers and allowed the babies to be delivered," Dr. Israel said, "we found, one, less bacterial adherence and, two, strikingly less bacterial penetration.

"So we think we have at least a partial explanation of why the immature neonate develops necrotizing enterocolitis. If further studies support our findings, we may ultimately be in a position to recommend the prophylactic administration of low-dose steroids to mothers at risk for delivery of premature infants to prevent the possibility of necrotizing enterocolitis."

Dr. Israel said that such a recommendation could be two or three years away. It must await not only further laboratory work but also a pilot project to do selected human studies.

Dr. Walker, who is also Professor of Pediatrics at Harvard Medical School, emphasized that the levels of steroids given would only be sufficiently high to turn on the development of surface molecules in the intestines which would then prevent abnormal bacterial colonization.

As these studies progress with funding by the National Institutes of Health, Drs. Walker, Israel, and Schiffrin stressed the importance of breast-feeding.

"Our unit is very much interested in growth factors which are present in the early breast milk of mothers feeding premature infants and women feeding babies delivered at term," Dr. Walker said.

"Our feeling is that the nature of these growth factors may accelerate the maturation of intestinal defenses."

Data have already been presented showing that corticosteroids exist in breast milk. It also contains at least three other kinds of growth factors: epidermal growth factor, interleukins 1 and 2, both produced by lymphoid cells; and gamma interferon.

If a woman cannot breast-feed her child, she can use breast milk expressed by other mothers who have ample supplies.

Physicians also recommend that if the baby was born prematurely, the milk should come from someone who delivered prematurely. Full term infants should receive milk from women who delivered at full term.

The question of breast-feeding perplexes many young mothers. They take a six-week leave from a job to have a child and wonder what would be the point of breast-feeding for so short a time.

Dr. Israel, who is also an Instructor in Pediatrics at Harvard Medical School, remarked:

"Even if mothers have to stop breast-feeding their infants after only six weeks, that short period of such feedings may ultimately prove to be extremely important in the baby's development."■

Dr. Esther Israel's pioneering studies on a severe intestinal disease in newborns reinforce her conviction that breast-feeding can be very important in a baby's development. In this photo, Dr. Israel waits for her visiting four-weeks-old son, Samuel, to awaken so she can nurse him.

SAT
COCONUT OIL
VEG Shortening

Although not animal products, coconut oil and vegetable shortening, used in many processed foods, contain a lot of unwanted saturated fat.

The Good Versus the Bad in Cholesterol

(Continued from Page 1)

cholesterol values between 200 and 240, and another quarter are over 240.

When someone's cholesterol is found to be high, the next step is to determine in a laboratory how much of the pearly crystalline substance is high-density lipoprotein (HDL) and how much low-density lipoprotein (LDL).

The name lipoprotein stems from the fact that since lipids are insoluble in water and blood plasma is mainly water, cholesterol has to team up with proteins for transport through the blood stream.

HDL is actually protective in that it draws cholesterol away from tissues like the coronary arteries and to the liver where it can be excreted in the bile.

LDL is the villain. Receptors for LDL are on the surface of cells that line the arteries. These receptors recognize a specific protein in LDL and initiate a chemical reaction that enables the low-density lipoprotein to attach to the arterial walls.

"Usually a person's total cholesterol contains about three to four times as much LDL as HDL," Dr. Freeman said. "But on occasion a particularly high level of protective HDL may be present, so it is wise to know what the breakdown is before putting the patient on any special diet or, especially, on any drugs."

Another important aspect of treatment is exercise. The vast majority of individuals enrolled in the exercise programs of the MGH–Harvard Cardiovascular Health Center range in age from 40 to the early 60s and have both premature coronary disease and a lipid abnormality.

Dr. Thomas L. Force, the center's Medical Director, said exercise can lower triglycerides in very low-density lipoprotein (VLDL) by 10 to 20 percent, and even more, depending on the patient's weight.

"The more obese the patient and the more weight that person loses with exercise the greater will be the decrease in triglycerides," the doctor said. "And as the VLDL comes down, protective HDL cholesterol will increase."

Women have particularly high HDL levels. Estrogen, the female sex hormone, plays a big part in this. High HDL also runs in some families. Members of such families do not seem to contract coronary disease.

Dietitian Denise DeSalvo analyzes computerized food intake data on patients to determine the extent of their fat and cholesterol consumption.

Niacin, a drug which has been around since the 1950s, can lower total cholesterol (and raise HDL in some men), but it can cause rashes and stomach pains. Diabetics cannot take it.

Cholestyramine and a sister drug, colestipol, both classified as bile acid resins, also have been used fairly widely to lower cholesterol, but they tend to cause abdominal bloating and constipation.

About a year and a half ago, a drug called lovastatin came into use. Besides having fewer known side effects than the other medications, lovastatin is much more potent.

Dr. Freeman, who is also an Instructor in Medicine at Harvard Medical School, said the only problem with lovastatin is that it has not been around long enough to know its long-term effects.

Before a physician can decide how aggressively to attack a patient's cholesterol problem, all of the individual's other coronary risk factors must be considered.

Being male is in itself one risk factor. Others include: a family history of coronary disease before age 55, hypertension, diabetes, cigarette smoking, and severe obesity.

One of every 500 Americans has abnormal cholesterol levels due to familial hypercholesterolemia. This inherited disorder is also found in about five percent of people who have had heart attacks.

Two physicians who trained at the MGH, Drs. Joseph L. Goldstein and Michael S. Brown, won the 1985 Nobel Prize in Medicine for discoveries that helped to explain familial hypercholesterolemia.

The researchers, who work at the University of Texas Health Science Center in Dallas, found that inherited faulty genes affected receptors in cells on arterial surfaces and prevented the removal of cholesterol from the blood stream.

Male patients who have the disorder due to a defective gene from one parent tend to have heart attacks in their 30s and 40s. Their cholesterol levels range between 300 and 500. Lovastatin has been helpful to those patients.

An individual who inherits the faulty gene from each parent—a one in a million chance—develops cholesterol levels between 800 and 1000 and can have a heart attack before the age of 3.

In general, the average person with cholesterol values only mildly to moderately elevated can reverse the rise through prudent changes in diet alone. A dietitian can provide valuable assistance

Massachusetts General Hospital

MGH News

Massachusetts General Hospital Boston Massachusetts

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Urologists Ponder the Impact of New Medical Care

Patients Control Their Own Pain Relief

Anyone who undergoes a major and fairly invasive surgical repair is usually quick to admit that "getting better hurts."

Consider someone with lung cancer. To remove a growth on a lung, surgeons must first penetrate the patient's chest wall. This usually involves cutting or retracting one or more ribs. When the patient later awakens from anesthesia, chest pain accompanies every breath.

Until the healing process is well under way, a standard treatment for acute, or self limited, pain is the giving of morphine, a potent narcotic which acts upon the central nervous system.

Since pain is a purely subjective experience, however, with only the patient capable of describing the presence and extent of any discomfort, the bedside practice of giving morphine has drawbacks. Insufficient morphine will fail to eliminate pain while too much can result in drowsiness, nausea, vomiting, dizziness, and even inadequate breathing.

What would be the optimal dose? Everybody is different. The pain that torments one person may not bother someone else very much. And a large person may require more medication than a small individual.

In the last half dozen years or so, more improvements have been made in the management of postsurgical pain than in any previous time. Among the most dramatic advances has been the development of a method that allows patients to control their own pain relief by administering

(Continued on Page 4)

Less than five years ago, close to 200,000 Americans a year underwent surgery or some other invasive procedure for the removal of kidney stones.

Today, it is uncommon to hear of a stone being extracted through an incision made in the kidney or in the ureter, the channel which carries urine to the bladder.

The surgery has largely been supplanted by such nonsurgical techniques as breaking up stones with externally transmitted shock waves and using a pulsed dye laser to fragment ureteral stones in areas the shock wave device cannot reach, such as behind the pelvic bone.

Just as stone management has undergone vast changes, nonsurgical methods are also on the horizon to replace certain operations on the prostate gland and the bladder.

A walnut sized male organ, the prostate gland virtually encircles the canal (urethra) that carries urine from the bladder through the penis and out of the body. During sexual activity, the prostate secretes a fluid that helps to transport sperm through the penis.

Since prostate surgery alone accounts for about half of a general urologist's practice and up to 40 percent of the specialist's annual income, Dr. George R. Prout, Jr., Chief of the MGH Urology Service, said the next few years may see many urologists reassessing their role in health care.

Referring to proposed new treatments

(Continued on Page 2)

Deborah Harrison, RN, sets up a patient controlled analgesia pump for a woman who has just undergone major surgery.

Inside

Page 6 . . . Heart patients with implanted defibrillators help each other.

Page 7 . . . A new test quickens the diagnosis of certain nerve disorders.

Tell Us What You Think...

MGH News Readership Survey - January/February 1989

(Please remove and complete the enclosed form and return to us by February 24)

Dear MGH News Reader:

We are reevaluating the content, design, frequency and focus of the MGH News and we need you, our readers, to help us. We want to be sure that the News is meeting your needs and keeping you informed.

Won't you please take a few moments to answer the following questions? After completing the survey, simply fold and tape it, and mail it back to us no later than February 24, 1989.

Thank you for your help!

Sincerely,

Martin S. Bander

Martin S. Bander
Editor
MGH News

MGH News Survey - January/February 1989

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1. How many people read your copy of the MGH News?
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3. Please indicate the extent of your interest in the following health care topics:

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Cancer	☐	☐	☐	Mental Illness	☐	☐	☐
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Section III - *Reader Profile*

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Dr. David Caplan confers with Argie Tiliakos, an MGH psychologist, in the Cortical Function Unit.

Rethinking the Brain's Control of Language

Studies conducted by an MGH neurologist have led him to rethink one aspect of how the human brain behaves.

Just as the brain contains areas to control such functions as breathing, vision, hearing, and smell, there is a separate region governing language. Within that zone lie several subregions to direct specific aspects of language processing.

Most neurologists believe that when a person suffers a speech disorder the cause will be found within that subregion of the language zone normally controlling the particular aspect of speech that was affected.

Research that led to a questioning of this position was conducted by Dr. David Caplan who transferred from the Montreal Neurological Institute last summer to become Medical Director of both the MGH's Language Disorders Clinic and Cortical Function Unit.

Dr. Caplan succeeded Dr. Vincent Perlo, who retired after being associated with the two units for 40 years, including 19 as their Director.

The Language Disorders Clinic focuses largely on children and adults with developmental dyslexia. The Cortical Function Unit assesses thinking processes in these patients and has been very helpful in deciding on appropriate educational programs for them. It also evaluates other patients who are neurologically impaired.

Dr. Caplan, who earned a doctorate in linguistics at M.I.T. before obtaining a medical degree at McGill University in Montreal, said it has been recognized for well over a century that a limited area of the brain is responsible for language function.

This so-called language zone—an area about 2½ or 3 inches long and 1 to 1½ inches wide—lies in the outer surface (cortex) of the brain.

If one imagined a line extending from the outer corner of the left eye to the middle of the left ear, the language zone would be situated in the brain about two inches above that line . . . at least in most people.

"The language zone is in the left side or hemisphere of the brain in about 98 percent of right handers," Dr. Caplan said. "In the remaining 2 percent, the zone is in the right hemisphere of the brain.

"As for left handers, 60 percent have the language zone in the left hemisphere, 20 percent in the right, and about 20 percent have it on both sides of the brain."

Dr. Caplan agrees with the general view that there is a central tendency in a language zone for a particular language processing operation to occur in a certain area of the zone. He contends, however, that across the entire population there are numerous exceptions, just as variability exists in the location of the zone itself.

The MGH neurologist, who is also Associate Professor of Neurology at Harvard Medical School, cited a study of 20 patients stricken with a speech disorder called "agrammatism."

The affliction blocks the output of small words in language, words like "the," "of," and "but." The production of nouns and verbs tends not to be disturbed.

Data on the patients, including CT (computed tomography) scans, were ob-

(Concluded on Page 6)

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in revising such a person's eating habits.

Last March, the MGH Department of Dietetics held a free, all-day cholesterol screening for MGH employees as part of the observance of National Nutrition Month. The screening was coordinated by Ms. Mary Kay Fox, M.Ed., R.D., Manager of the MGH Nutrition Service.

Eleven hundred tests of total cholesterol were given. Forty eight percent of the participants were found to have levels above 200 (30 percent between 200 and 240, 18 percent over 240).

"Many of these MGH employees had never undergone cholesterol testing before," Ms. Fox said. "When we sent the results out to them, we included brochures explaining the latest recommendations for safe levels of cholesterol, and we provided basic written information on healthier diets. Results were also sent to employees' primary care physicians."

The Nutrition Service also offered classes to those with a cholesterol of 200 or higher.

"We plan to offer another screening this year; March 23rd is the tentative date," Ms. Fox said. "The plans are still being finalized, but one thing we certainly want to do is follow up last year's results to see how the MGH community is progressing in efforts to lower cholesterol."

People sometimes give up on diet because they do not have adequate information. The supermarket, for example, can be a very confusing place. Labeling information on foods is often misunderstood by the consumer.

A product that says "no cholesterol" or "low cholesterol" may actually be very high in fat, particularly saturated fat.

"There are many critical facts that people should be aware of in making food choices," Ms. Fox declared. "Most folks are not aware, for instance, that a single ounce of cheese contains as much fat as three ounces of lean, red meat, and twice as much saturated fat."

The MGH Nutrition Service offers an eight-week program called "Eating for the Health of It." One popular feature of the program is a weekly Consumer Report, which teaches what Ms. Fox calls "supermarket survival skills."

On Thursday nights the class receives a demonstration of quick and practical ways of healthful cooking. The members are then treated to a full-course dinner, prepared and served by the Department of Dietetics.■

Genetics May Be Linked with Language

(Concluded from Page 5)

tained from centers in Europe, Japan, and India, as well as various places in the United States and were analyzed in Montreal.

“The patients were deemed by their centers to be typical of those with agrammatism,” Dr. Caplan said. “Most had suffered a stroke but some had a brain tumor or a form of head trauma, totally different processes. Yet, all had the same type of syndrome.”

Dr. Caplan said that in some of the patients he and his colleagues studied the illness or injury had destroyed portions of their language zone. The loss ranged from perhaps a 10th of the zone to as much as three quarters.

“When the amount lost was small,” the doctor said, “it had sometimes been in the anterior [front] part of the zone, sometimes in the middle, and on one occasion, which was most surprising given what neurologists believe about this syndrome, the lesion was a purely posterior one that did not affect the anterior portion of the language zone at all.”

The standard view among most neurologists, he said, is that the front part has to be affected to produce the syndrome.

Theoretically, Dr. Caplan said, the agrammatism study indicates that the cause of language being in one spot or another is not necessarily explained by any pattern of connection to motor or sensory areas of the brain.

“There has to be another factor that will put language into particular areas of the brain independent of areas that sensory and motor systems are connected to,” he said, “and my best guess is that the factor is genetic.”

A major reason for this belief has to do with the variability in the location of the language zone, i.e., the left or right hemisphere of the brain. Such variability differs in left and right handers, and whether a person is left or right handed is predetermined genetically.

Dr. Caplan suggested that genetic factors also direct the development of the cortex, the gray matter of the brain:

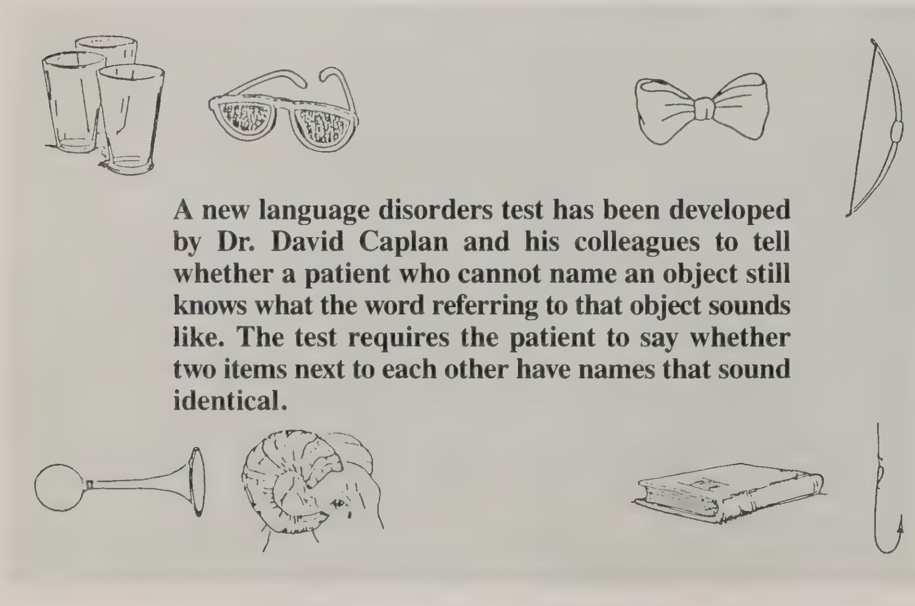
“I think the relative size of particular areas of the cortex and the timing of their development are genetically determined just as this is true for the development of the heart or the liver or one’s arms.

“My guess is that most of this is inherited in the same way in 99 percent of humans. We get a complement of genes and it codes for development of the brain in a very stereotyped way, but it is not entirely stereotyped.

“Everybody has a head that sits on a neck, but one person’s head may be larger or smaller than another’s, and one person’s neck may be longer or shorter than another’s. The genetic program for development contains some variability of expression. That variability affects the cortex as well and, in particular, the relative size of subsections of the language zone.”

Dr. Caplan said that professionals who treat speech disorders should not be overly concerned about exactly where an insult has occurred in the brain but rather what can be done to reeducate and rehabilitate people with language problems.

“I’m not saying that a care giver should ignore the neurological side of things,” Dr. Caplan emphasized. “The size and type of an injury have an effect on the severity of the aphasia. But the specific site of the damage has much less of an effect, I think, than some people would say.”



A new language disorders test has been developed by Dr. David Caplan and his colleagues to tell whether a patient who cannot name an object still knows what the word referring to that object sounds like. The test requires the patient to say whether two items next to each other have names that sound identical.

Dr. Caplan was invited to present and discuss his theories at the 155th national meeting of the American Association for the Advancement of Science, scheduled for January 14 to 19 in San Francisco.

Only by conducting large population studies with CT, MRI (magnetic resonance imaging), and to the extent possible with PET (positron emission tomography) will researchers be able to characterize speech disorders in detail and determine whether Dr. Caplan’s theories are correct.

If they prove to be, then, in his opinion, it may be possible in the long run to know if the course of recovery will depend on whether the affected language component is in a typical place or somewhere else in the language zone.

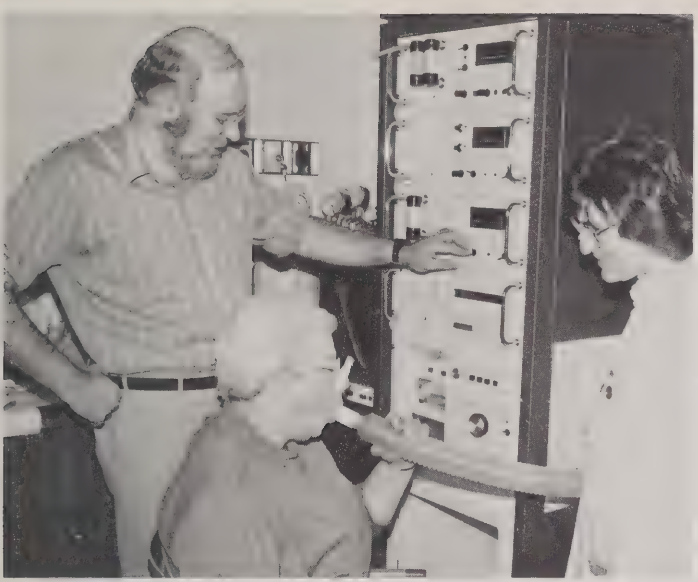
As for treatment, surgery cannot yet overcome language impairments due to brain damage. And drugs are helpful in language situations only to the extent that they may control an underlying condition, such as epilepsy. There are no stimulants that can be given to a stroke patient, for example, to enhance the transmission of brain signals to improve language.

Therapy is essential, however, in Dr. Caplan’s view. An untreated patient with a speech impairment does not exercise language as much as one who is under therapy. A patient needs the support of a professional who has a sense of what the individual’s life is really like. There is ample evidence that the speech–language pathologist can make an important difference in levels of recovery.

In the past five years, Dr. Caplan has been particularly encouraged by reports of progress among some chronic patients.

Their language disturbances were studied in detail, both linguistically and psychologically, and then very specific treatment programs were targeted at the particular deficits. Even though some patients had discontinued speech therapy years before or had shortened treatments to perhaps once a month because little progress was being made, remarkable improvements were noticed.

“What that tells me,” Dr. Caplan said, “is that in some situations, perhaps in many, if one knows enough about what is specifically wrong with the language processing system and can make up the materials and give people exercises that speak to those deficits, it becomes quite possible to achieve success.”■



Using a spirometer, Pulmonary Technician Barry Callahan measures the air volume in the lungs of Rose Levine as Nurse Practitioner Carole Nania, RN, looks on.

Tuberculosis: Still a Peril in Many Cities

. . . The diagnosis and treatment of the disease have improved so markedly that many patients are being cured in half the former time.

. . . Since the government began reporting nationwide health statistics in 1953, the incidence of the illness has declined approximately six percent each year.

. . . And although the disorder, if left untreated, can take the lives of half of those stricken, drug treatment has helped to reduce the mortality rate 94 percent in the last 35 years.

These encouraging developments in the long battle against tuberculosis would indicate that slowly but surely the malady which struck 84,000 Americans in 1953 is on the wane as a major public health peril.

The TB picture has another side, however, one that health officials are scrutinizing. In the past couple of years, a large number of major cities in this country have experienced a rise in their incidence of TB.

To mention a few—all with populations over 250,000—which recorded more TB cases in 1987 than the previous year: Atlanta, Baltimore, Buffalo, Charlotte, N.C.; Cleveland, Dallas, Denver, Fort Worth, Fresno, Honolulu, Kansas City, Los Angeles.

Miami, Minneapolis, Nashville, Newark, Oakland, San Francisco, St. Louis, San Diego, San Jose, Seattle, Tampa, Toledo, and Wichita, Kan.

Figures available for New York City covering the first 10 months of 1988 showed that that city had 407 more cases of tuberculosis than during the corresponding period in 1987.

In those same 10 months of 1988, a total of 21 states and the District of Columbia recorded higher TB statistics.

Dr. Leo C. Ginns, Director of the MGH Pulmonary Clinic which includes a section for the care of TB patients, attributed much of the rise to "the changing patterns of individuals who are at risk for tuberculosis."

"I think it is clear," Dr. Ginns said, "that immunosuppressed people, especially those with or at risk for the human immunodeficiency or AIDS virus, are adding to the tuberculosis population.

"Individuals with HIV infections have a risk for TB estimated at 100 to 200 times greater than that of the population at large."

Then, there are the homeless. Suffering from poor nutrition and often found living under crowded conditions with others similarly in poor health, the homeless are at a decided risk for infection by the tuberculosis bacteria. The organisms are transmitted primarily by airborne droplets exhaled by persons with TB in their respiratory tract.

Ralph Timperi, Director of the Center for Communicable Diseases in the Massachusetts Public Health Department, recalled a homeless man in one of Boston's largest shelters who was found to have TB.

The man had suffered from the disease previously but apparently was an exception to the general view that once stricken and treated a person develops an immunity to reinfection.

"He was struck the second time by a strain of TB that is very resistant to treatment," Mr. Timperi said. "As a follow-up, we instituted a very intensive screening of his known contacts and found he had spread TB to more than a dozen other people.

"All of the cases required intensive treatment, which is hard to carry out in this kind of population. You can't always get patients to come back regularly or to take their medications."

Others at high risk for TB are immigrants from countries with a high prevalence of the disease. Refugees from Cambodia, Vietnam, and Laos qualify.

"The levels of infection among people in Southeast Asia are higher than elsewhere," said Jennifer Cochran, who directs the Massachusetts Public Health Department's Refugee Health Program.

"Prior to their arrival, immigrants are screened with a chest X ray to rule out any active disease. When they arrive, they take a tuberculin skin test. If a test proves positive, the individual is evaluated further. If appropriate, prophylactive therapy will be given. Bilingual workers act with public health nurses in each locality to ensure that the new arrivals receive treatment, understand the treatment, and follow through with it."

Dr. Ginns said that more than half of the cases of active TB that occur among Asian immigrants are found within their first two years in this country.

America's elderly constitute another major group at risk for TB. Ninety percent of all people who become infected are able to ward off active sickness by building a wall of resistance around the bacteria. For most, these defenses are adequate to keep the organisms dormant throughout life. But for others resistance may be lowered late in life by other

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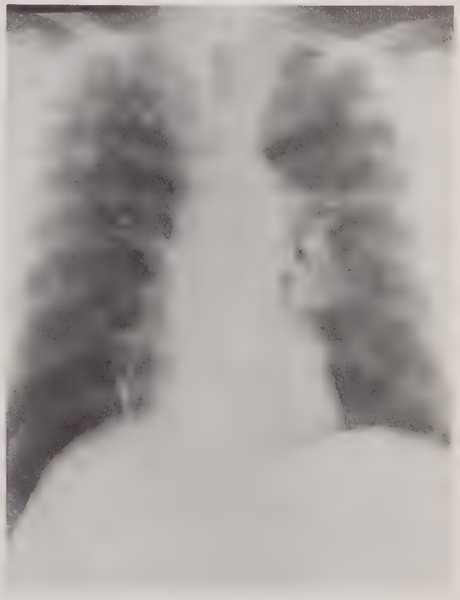

A chest X ray of a tuberculosis patient

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For Some TB Patients, a Speedy Cure

(Concluded from Page 7)

disease states, malnutrition, or drugs that compromise the immune system.

Although tuberculosis has declined over the years, it is still a prominent consideration in evaluating many patients at the MGH, particularly those with pulmonary disorders, nonspecific chest X-ray abnormalities, and such clusters of symptoms as cough, unexplained fever, the passing of blood-tinged sputum, shortness of breath, night sweats, and weight loss.

"In the past, people have intuitively considered health care workers to be high TB risks for obvious reasons," Dr. Ginns said, "but recent studies have showed that infections in such workers were highest among those who did not have patient contacts, suggesting their infection was community-acquired instead."

So-called BCG vaccine used to be recommended for health care workers as a protection against TB. The recommendation has since been dropped in favor of surveillance by periodic tuberculin skin testing and preventive therapy with the drug isoniazid (INH) for those whose tests prove positive.

BCG vaccine itself is now proposed only for children with negative skin tests who cannot be placed on INH therapy but who have continuous exposure to persons with active disease, those with continuous exposure to patients with organisms resistant to INH and the drug rifampin, and those belonging to groups with exceptionally high annual rates of new infection.

Until recent times, the standard duration of therapy for tuberculosis was one year. With the availability of highly effective drugs, federal health officials reduced the duration to nine months. Now, physicians generally agree that in selected, uncomplicated cases, six months may be sufficient time to eliminate the bacteria.

(In most cases, the treatment calls for two months on isoniazid, rifampin, and pyrazinamide, each of which attacks TB through a different mechanism. Four months of treatment then follow using isoniazid and rifampin only.)

Dr. Leo Ginns gives a routine tuberculin skin test to Elinor Dickey in the MGH Pulmonary Clinic.

Dr. Ginns, who is also an Assistant Professor of Medicine at Harvard Medical School, cautioned that there are still certain caveats which dictate who is acceptable for preventive therapy.

"In large part, these are based on age," he said. "Older individuals have a tendency to develop problems associated with the drugs themselves, mainly in terms of liver dysfunction.

"The accepted standard has been that for anyone under the age of 35, the risks of developing TB in later life outweigh any risks of toxicity from the medication. With each additional decade of life, the risks of adverse side effects begin to outweigh the potential benefits of the therapy."

To put it another way, the 60- or 70-year-old with a positive skin test but a normal chest X ray and no symptoms would primarily be observed. A 25-year-old, on the other hand, would qualify immediately for the preventive therapy.

A new recommendation calls for dropping chest X rays as a routine screening technique for TB. The method has not been sufficiently productive. It has also been suggested that once somebody has successfully completed TB treatment and is asymptomatic, subsequent routine yearly chest X rays also are not needed.

As the fight against TB progresses, new drugs are being developed and tested. And a new DNA probe kit has come on the market to speed the identification of TB organisms so that interventions can be designed and implemented earlier.

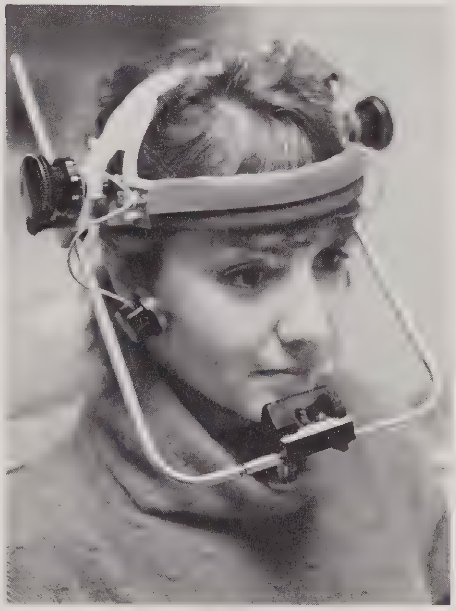
"At one time, a sputum culture had to be grown in a laboratory for one to three months before you could know what was present," Dr. Ginns said. "With the DNA probe, the growing process requires only one to four weeks time."

Investigators, meantime, are reported close to being able to use the DNA probe directly on the sputum. When that happens, intervention and prevention will be vastly improved, especially in places where the homeless are sheltered. ■

MGH News

Massachusetts General Hospital, Boston, Massachusetts Vol. 48 No. 2 March 1989

An Improved Way to Analyze Noisy Jaw Disorders



What seems like a telephone headset (worn by Oral Surgery Assistant Ellen Wilfert) actually is an apparatus designed to detect noises caused by jawbone disorders.

The sounds have been likened to a click . . . snap . . . pop . . . or crackle.

Sometimes they are so faint not even a stethoscope can detect them. At other times they are so loud people sitting across a room can hear the noises.

At some point in life, millions of Americans endure problems with the temporomandibular joint (TMJ), the mechanism which enables the jawbone to open and close.

Difficulties with muscles controlling the lower jaw account for a large percentage of TMJ disturbances. These complaints, which may be simply due to a bite imbalance or a grinding or clenching of teeth, are usually corrected easily. A dentist may prescribe warm rinses, a soft diet, a limited opening of the mouth for a while, or use of a special appliance to be worn at night.

Coping with other TMJ conditions, such as those causing noisy joints, may prove more complicated.

To diagnose what is going on, practitioners have customarily relied on a radiological procedure called arthrotomography.

Although excellent for showing and identifying certain TMJ abnormalities, arthrotomography costs several hundred dollars, must be performed in a hospital setting, and involves use of an iodine-containing contrast material that may produce an allergic reaction.

Research at the MGH and the University of Connecticut during the last several

(Continued on Page 2)

Job-Related Exercise Spurs the Recovery Of Injured Workers

After six years of plying the Atlantic aboard draggers to catch cod, flounder, and haddock, Gary McNally feared one day last summer that his career as a commercial fisherman had come to a crashing end.

Gary suffered severe hand injuries when his motorcycle and an automobile collided. In the impact, the motorbike's rear-view mirror shattered, and slivers of glass tore through four tendons in the right hand of the 27-year-old Falmouth resident.

A six-week series of treatments in the MGH's Wang Ambulatory Care Center restored function to the hand, Gary's dominant one, but his aspirations of rejoining the New Bedford fishing fleet depended on further recovery.

The MGH's physical and occupational therapy departments moved to fill the void with a program called "Work Hardening."

Offered at the hospital since July 1987, the program is specifically designed to help patients once again meet the physical demands of an occupation or to return to the workplace in another capacity following treatment for trauma or disabling disease.

Working with Gary was a particular challenge because he needed to do more than redevelop range of motion, strength, and dexterity of his hand. Since the vessels on which he labored for up to eight days at a stretch were often buffeted by rough seas, he also had to be able to balance himself while holding ropes.

After Gary underwent general reconditioning and strengthening exercises, his therapists created a balance board to simulate the rocking of a boat. As part of his training, the young patient would stand on the board and, using a pulley system, repeatedly hoist over his head a milk crate containing a 25-pound weight.

During six weeks in the program, Gary also repaired netting, and he simulated hauling a net aboard a dragger by pulling on a rope attached to a crate containing an 80-pound weight. His task was to pull the crate across a floor five times daily to build endurance.

With the passage of time, Gary reached his main goal, regaining the ability to shift 100 pounds from one spot to another, a frequent need in his line of work.

"In the beginning there were times when I felt my hand was not going to

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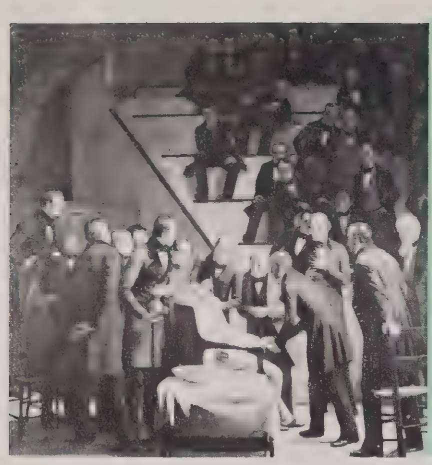
Inside

Page 5 . . . More doctors gain access to medical support system.

Page 7 . . . Still learning about polio years later



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EDITORIAL:

A Cruel Turn of Fate

The year was 1955. Polio seemed to be everywhere, and parents were frightened. On the 11th floor of the MGH White Building were many of the most severely stricken patients. They were each confined inside a cylinder called an iron lung. By today's standards the iron lung was a primitive device. But it kept alive those polio victims whose own paralyzed lungs could no longer inhale life-giving air.

As the numbers of patients with bulbar polio increased, the MGH ran out of iron lungs. For a short time, doctors, nurses, and medical students used an anesthesia breathing bag to squeeze air into the lungs by hand. Soon the respirator, a mechanical breathing apparatus, replaced human power. And soon, in the United States, the Salk vaccine made polio pretty much a disease of the past. But not quite.

A page 7 article describes the renaissance of polio symptoms in patients whose memories of having had the disease had somewhat dimmed through the years. For those unfortunate thousands the return of the symptoms is a cruel turn of fate. For victims of post-polio syndrome it may be of little solace that the recurrence may lead investigators to learn a lot more about polio and similar problems like Lou Gehrig's disease (amyotrophic lateral sclerosis). Still the rewards of the research may come in time to help some of the current victims of post-polio syndrome. That would be a fitting end to such suffering.

Rebuilding Competence and Confidence

Sometimes modern medicine can be so technologically oriented that the patient becomes anxious rather than soothed by the very instruments that make diagnosis, treatment, or cure possible. That is why the therapy called work hardening (Page 1) is so appealing. It takes its cue from the world of work, the specific work to which the patient wants to return. Occupational and physical therapists use devices or adapt techniques to retrain people for the job that seemed so remote after a disabling injury. Rather than provoking anxiety, the devices and techniques of work hardening let the patient retrain on a one-to-one basis with the therapist. The gradual return of confidence brings the day of return to work so much closer and less frightening.

Noises From the Jaw

(Continued from Page 1)

years has led to a new diagnostic method that involves no radiation exposure and can be conducted in a doctor's office in only a few minutes.

Called arthrophonometry (APM), the new computerized technique forms a diagnosis by correlating joint noise with the opening and closing of the jaw.

Still in an investigational stage, APM's use in patient-care trials has been financed by a grant from the National Institutes of Health. Once the system becomes a part of routine practice, its cost will probably be similar to that of a dental X-ray exam.

A particularly important advantage of APM is the safety of frequent repetitions to follow a patient's response to treatment. That cannot be done as often with a procedure which exposes a patient to radiation.

Patients appear to be bothered more by clicking and other sounds in the TMJ than noises in any other joint because the TMJ is but a fraction of an inch from the ear canal. The louder the noise the more the patient might worry that it represents something serious.

The condition can be particularly annoying to a public speaker, a singer, or a musician who plays an instrument requiring some movement of the jaw.

The sounds could be caused by degenerative joint disease, such as rheumatoid arthritis or osteoarthritis, but more likely they indicate a slippage of a fibrous connective tissue component, also called a meniscus or disc. It acts as a cushion between the hinge (condyle) of the jawbone and the temporal bone of the skull which contains the socket for the condyle.

Dr. Charles N. Bertolami, an oral and maxillofacial surgeon, conceived and developed APM with Thomas Gay, Ph.D., who is a professor of biostructure and function at the University of Connecticut.

"In many cases, after examining a patient, using a stethoscope and a ruler or other gauge, and after obtaining a history, a clinician already feels confident about a diagnosis," Dr. Bertolami said, "but wants documentation to prove it.

"The hearing acuity of people differ. The ability of one person to determine where a sound occurs at a particular level of jaw opening and closing is quite variable from one examiner to another.

"The sensitivity of the APM system is

Photographs: Myron Daniels
Drawing: Edith Tagrin, MGH Medical Art

much greater than that of the examiner. And it not only provides direct measurements but also a screened display and a hard-copy readout of the data.

"One can visually determine exactly where the sound occurred in the opening and closing cycle, how long the sound lasted, and the nature of the noise."

The patient being examined wears a special headset containing the gear necessary to relay data to the computer. The equipment includes microphones that press against the condyle near each ear and a special optical scanning device that is positioned at the mouth to track jaw movement.

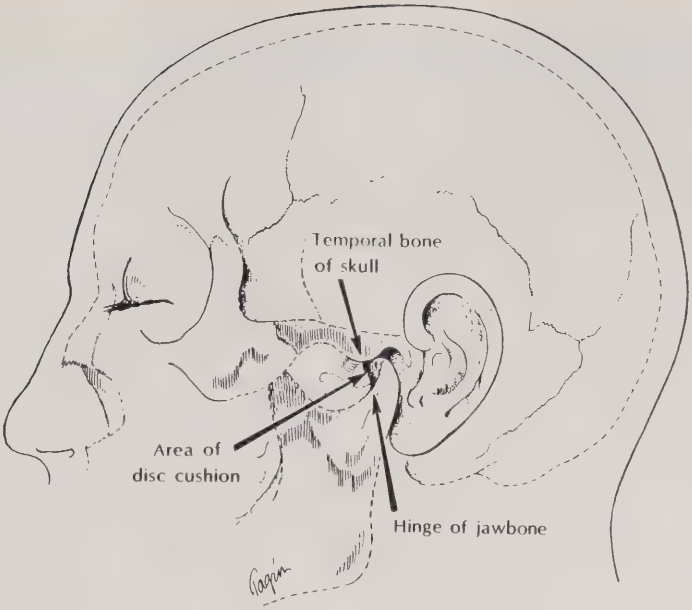
"All we tell the patient to do is open and close the jaw at a natural and steady rate," Dr. Bertolami said. "The computer automatically picks up the clicks or other noises. Both sides of the jaw are studied simultaneously, unlike X-ray tests which study only one joint at a time."

APM has no direct application in TMJ muscle problems (so-called extracapsular disease). Although pain in the muscles is referred to the joint, both APM and existing X-ray techniques show the joint to be anatomically and functionally normal.

APM studies have demonstrated a unique relationship, however, between disc and condyle conditions (intracapsular diseases) and TMJ sounds and jaw movements.

A slipped or displaced disc can obstruct the opening of the mouth, but often the patient can force the mouth to open and close. In this situation, the patient hears a sound as the jaw opens and another as it shuts.

The slippage may be so severe that the mouth cannot open. Before APM came on the scene, some clinicians felt that no sound occurred in this instance. APM has shown, however, that sounds do arise due to compression of the disc.

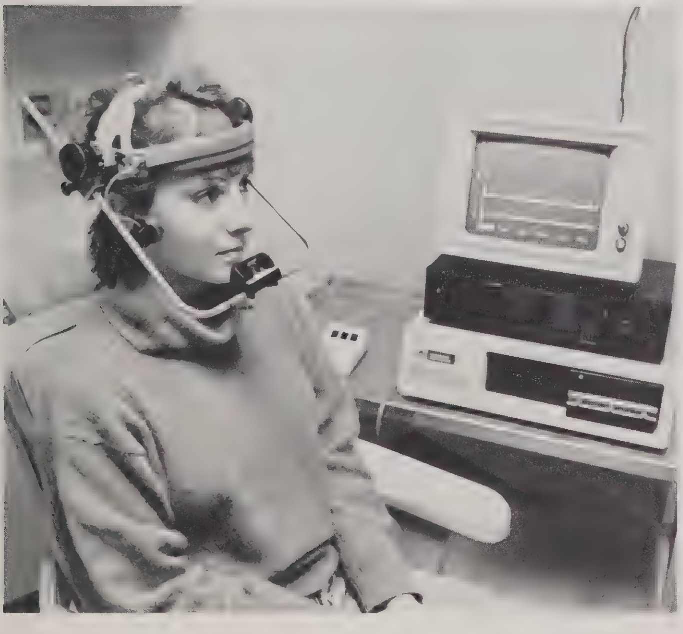


Abnormal sounds during jawbone movement often can be attributed to a slippage of cushioning tissue between the hinge of the jawbone and the temporal bone of the skull which contains a socket for the hinge.

When degenerative joint disease is present, APM picks up a noise of long duration during opening and/or closing of the jaw.

Some 200 MGH and University of Connecticut patients with TMJ complaints have taken part in clinical trials to determine how arthrophonometry rates with arthrotomography and other diagnostic techniques in sensitivity and specificity. APM got high marks.

In some instances clinicians found the APM findings to be so definitive they decided not to subject the patient to arthrotomography.



Besides receiving and analyzing jawbone noise data, a computer also makes a permanent record of findings for comparison during treatment with follow-up test results.

Dr. Bertolami recalled a woman who volunteered for the study but admitted on being asked that she had suffered an allergic reaction earlier during a kidney study. Since the contrast material used in arthrotomography is the same one used in renal tests, she was automatically excluded from having arthrotomography.

Also excluded as study participants were people with a combination of TMJ difficulties. The researchers sought as clear a representation of a single problem as possible.

Once a diagnosis has been made, the treatment for intracapsular TMJ conditions may vary. Physical therapy or the fabrication of a simple appliance may be all that is needed to restore a displaced disc to its normal position.

Sometimes a ligament that attaches the disc to a portion of the external auditory canal becomes lax or torn, thus allowing the disc to slip forward. A dentist might make an appliance to take pressure off the disc and give the ligament a chance to reposition itself.

Despite the clicking that occurs, if the patient can open and close the mouth surgery is usually unnecessary.

The APM profile of a joint affected by degenerative disease is totally recognizable and distinct from that of a displaced disc. Treatment for degenerative disease can range from palliation with pain relievers to arthroscopic surgery, using tiny instruments to smooth the arthritic surfaces of the joint, or conventional surgery to recontour or replace the joint.

(Concluded on Page 4)

Job Exercise Tailor Made for Patients

(Continued from Page 1)

come back," he said, "but the therapists kept encouraging me. While I still have some problems with my fingers, I've regained about 85 percent of function in the hand and eventually, I've been told, its general strength may return to normal."

Work hardening—the retraining component of an Industrial Rehabilitation Program—is not a new concept. Grania Fishwick, Director of Occupational Therapy at the MGH, said that the program goes back 30 years or more but only in the past seven has it developed in a way that attracts nationwide interest.

"New testing procedures and equipment have evolved that provide a more accurate measure of a person's physical ability to accomplish lifting and reaching tasks, as well as simulated specific functions that are part of one's job," Ms. Fishwick said.

"Due to the rising costs of workman's compensation, companies are utilizing these programs to get people back to work quicker and safely."

Patients seeking to enroll in work hardening must first undergo a comprehensive evaluation of their functional and physical capabilities to determine if the program would be beneficial to them.

Equipped with a variety of handles, wheels, and other attachments, one device used in the program can assist a patient in virtually every kind of life task. At the same time, the machine can grade physical capability and add resistance to an exercise to make it more difficult and challenging.

Kathleen Gill, the MGH's Assistant Director of Physical Therapy, said that physical and occupational therapists work as team players in work hardening.

"Many times a patient has been out of work for so long that general physical reconditioning is necessary in addition to retraining in specific work-related activities," she said.

"The physical therapist would set up the general program and incorporate that with work hardening techniques custom tailored by the occupational therapist. The therapists constantly work hand in hand to help the patient progress."

The length of the work hardening program varies according to each patient's needs. "I usually tell my patients that the program extends from four to six weeks and that they must demonstrate some progress weekly to stay enrolled," said Jil Perlmutter, an occupational therapist. "Not everyone works out daily, but I encourage most to do so for up to two hours for optimal results."

Patients treated in the MGH's work hardening program have included two Boston police officers. Physical Therapist Thomas Emerson treated one officer who had suffered a forearm fracture.

"We worked to rebuild his strength and flexibilities so that once again he would be able to use his nightstick effectively, if the occasion arose," Tom said. "The officer also retook firearms training on a range."

Diane Heislein, another physical therapist, said the other officer had injured the tip of the index finger on his dominant hand while apprehending a suspect.

"He feared that in the future the injury might interfere with his ability to draw and fire his service weapon," she said. "In work hardening, he practiced firing a heavy-duty staple gun which had a power-

In occupational therapy, John Walsh, a power company troubleshooter, relies on feel to tighten a series of nuts and bolts. He suffered burns on both hands and sensory problems in his fingers when a switch in a manhole exploded.

Trials of Jawbone Noise Test Widen

(Concluded from Page 3)

Dr. Bertolami does not expect health professionals to rely entirely on APM in determining whether surgery is required for a patient.

"All diagnostic methods have to be assessed in terms of their sensitivity and specificity," he declared, "And there is no one method that is 100 percent sensitive and 100 percent specific."

Some patients receive injections of a steroid to help ameliorate symptoms of their degenerative joint disease, but Dr. Bertolami cautioned that this carries some risk of destroying the joint.

The APM trials, meantime, have been extended to the University of California at Los Angeles, where Dr. Bertolami recently accepted an appointment to be Chairman of the Section of Oral and Maxillofacial Surgery; and to the Fargo Clinic in North Dakota.

Work to refine APM instrumentation is also continuing at the University of Connecticut.

Progress reports on the studies directed by Drs. Bertolami and Gay have been published in the *Journal of Oral and Maxillofacial Surgery* and the *Journal of Dental Research.* ■

ful recoil. This exercise helped him to redevelop strength in his hand and improved his tolerance for the sharp recoil that is associated with a firearm."

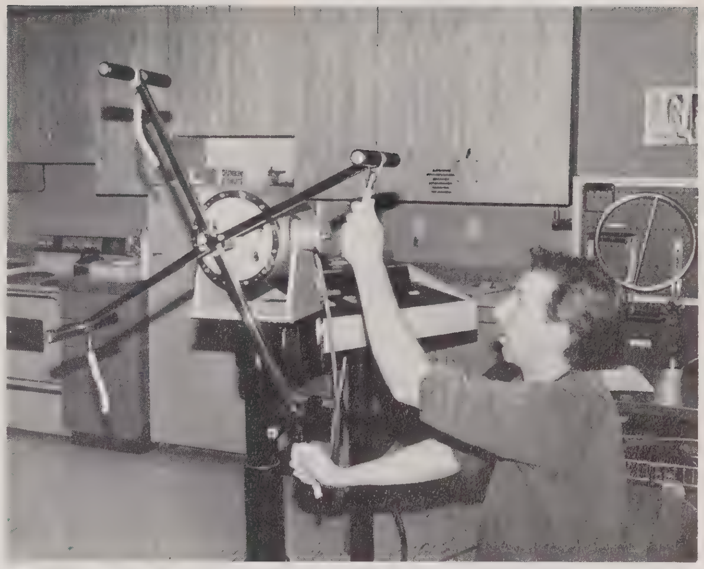
A power company troubleshooter was treated at the MGH for burns on both hands suffered in a manhole explosion, but sensory problems in his fingers were slow to resolve. Enrolled in work hardening, he engaged in activities dependent upon feel, such as tightening nuts and bolts that were out of his line of sight.

A maintenance worker for a state agency in Massachusetts broke his left wrist in a fall from a ladder. His recovery course included exercises to strengthen the wrist by bending and rotating it. Pulling on ropes attached to a vertical wheel also simulated climbing a ladder again.

Often, a lot of education goes with work hardening. A young man entered the program after treatment for neck and lower back injuries suffered when the windshield of his newspaper truck blew in on him.

"He needed to relearn how to get in and out of his van, how to sit properly, and how to carry heavy bundles of paper," said Tom Emerson. "We taught him ways of doing things to avoid strain, such as using a special support for his back while sitting.

A construction worker threw his back out while shoveling. As part of his therapy, he was assigned to carry 28-pound cement blocks from a pile and stack them as if he were constructing a wall. As he did this, closely supervised by a therapist, he was advised of how to prevent undue strain.



Stephen Thompson, a maintenance worker for a state agency, broke his left wrist in a fall from a ladder. Here, he exercises his repaired wrist by pulling on ropes attached to a vertical wheel to simulate climbing a ladder.

Quite a few nurses enroll in work hardening because of back injuries suffered on the job. They learn the proper body mechanics needed while turning patients in bed or in transferring them.

Not all patients in the work hardening program are able to return to their jobs. If a patient has been unable to regain full physical capability, a vocational counselor may be asked to assist the individual in exploring alternative vocations.

On occasion, Jil Perlmutter has called a patient's employer, explained what the employee was now able to do, and inquired whether some lighter duty might be available. The companies have sometimes responded by proposing a few less exerting responsibilities and inquiring in turn whether the employee can handle these.

Ms. Gill of physical therapy said that many educational courses are being offered to physical and occupational therapists throughout the country on how to start a work hardening program.

"It has tremendous potential," she said. "It is being started in hospitals, clinics, and in the private sector. At the MGH, the program is still at the grass roots level but we have ideas for expanding it in the future."■

More Doctors Gain Access to Medical Support System

The American Medical Association has opened the way for potentially widespread use of a computer-based program developed by the MGH to help physicians with diagnostic decision-making.

The AMA has notified its more than 271,000 members that it is dropping its subscription charge for member access to AMA/NET, the organization's electronic information network for physicians. A subscription fee will continue for non-AMA members.

The network's many services include searches of the medical literature, information on interactions among drugs, up-to-the-minute medical news, an AIDS Information Service, continuing medical education programs developed by the MGH, and DXplain, a diagnostic decision support system developed by staff members of the MGH Laboratory of Computer Science over the past five years.

To use the services, a physician needs only a personal computer or terminal with telecommunications capabilities and a telephone line. Usage fees are structured much like one's monthly telephone service, but there is no obligation to use the network and no minimum charge.

DXplain provides diagnostic assistance by presenting plausible explanations for a given set of signs, symptoms, and laboratory data.

A typical DXplain case interaction usually takes less than 15 minutes of connect time with the computer. The physician enters pertinent patient information and requests a computer interpretation. After a slight delay, the system will respond with its diagnostic hypotheses. The user can select additional features, such as a justification of why a particular disease was included.

Since subscription to the AMA/NET became a membership benefit, an estimated 15,000 additional members have signed up to access the network.

Dr. G. Octo Barnett, Director of the MGH Laboratory of Computer Science which created DXplain with AMA support, said the program undergoes continual revision, updating, and expansion.

When it was first announced in June of 1987, DXplain contained data on 1,955 diseases and recognized more than 4,700 clinical signs, symptoms, and laboratory data. The number of diseases is now about 2,100, and many more laboratory findings have been added.

"DXplain is continually evolving," Dr. Barnett emphasized. "Six physicians work on this as a continuing activity."

Dr. Barnett has received considerable feedback about DXplain.

"Some physicians say that DXplain was very important in suggesting they should

(Continued on Page 6)

Medical Aid System Valuable in Teaching

(Continued from Page 5)

consider a particular disease or in giving them better insights into a disease," he said. "For such people, DXplain clearly fulfills a need.

"Others have yet to see a need for DXplain. They don't feel comfortable putting signs and symptoms into a sort of 'black box' to solve a diagnostic problem."

Dr. Barnett, who is also Professor of Medicine at Harvard Medical School, said the use of DXplain as a teaching tool is probably as important as its use in helping to diagnose actual patients, if not more so.

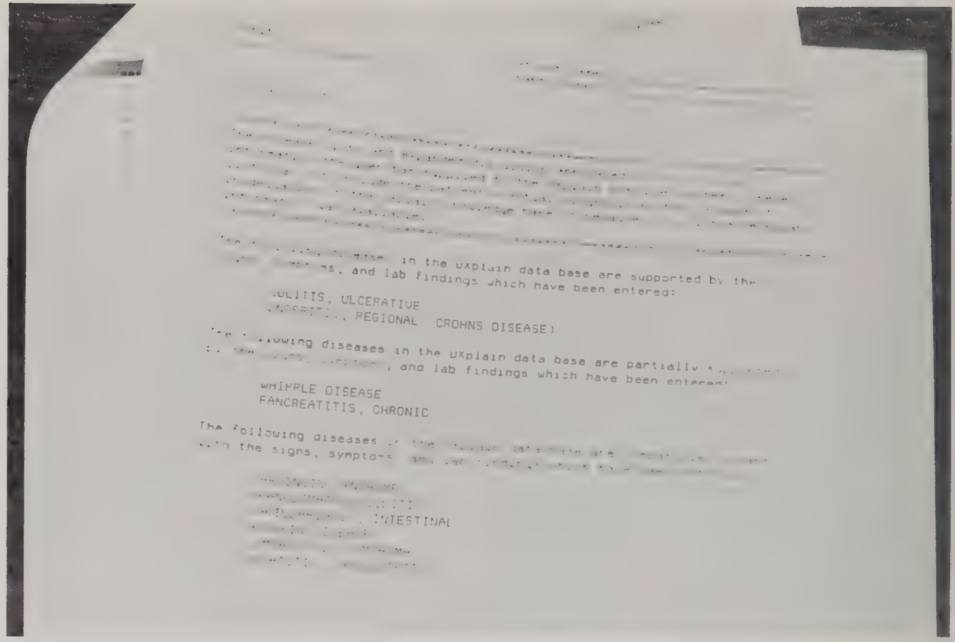
"In a sense," he said, "what we're saying is: 'Here is another type of medical textbook for one's continuing education, either as a beginning physician or as a doctor already out in practice.'"

At a meeting of the American College of Physicians, delegates heard of a colleague at a major hospital who involves DXplain in his morning rounds with residents. Puzzling patient-care situations are entered into the computer, and its output helps the young doctors think about what the diseases might be.

Some people might ask: "Is there a danger of DXplain becoming a crutch for some students?"

Dr. Barnett said it is no more a crutch than referring to a textbook or a journal article or asking a more senior physician for an opinion about a patient.

In this day and age, he added, the practicing physician cannot depend for long on what was learned in medical school because the information often is soon outdated.



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    WHIPPLE DISEASE
    PANCREATITIS, CHRONIC
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    [illegible] INTESTINAL
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A glimpse of how DXplain provides diagnostic suggestions

Dr. Barnett pointed out that DXplain has a few significant advantages over a medical textbook as a source of diagnostic assistance. DXplain's electronically stored medical data can be accessed by the user in ways that often are much more useful, e.g., to find all the diseases which can cause a combination of vomiting, convulsions, and a skin rash is a simple task readily accomplished with DXplain.

With a medical textbook, the user would need to spend considerable effort consulting the index to look up a number of different diseases which can cause one of the manifestations. It is impossible to use such an index to find a list of diseases which can cause the particular combination of symptoms and signs.

The DXplain database, in addition, is readily updated. Thus any new clinical manifestations or new information about a disease entity can easily be added.

Despite its sophistication, DXplain does have shortcomings. For one thing, it does not recognize all of the terms that a user might enter. Medicine's vocabulary has become extraordinarily large. Whenever new ways to say something are identified, they are added to the system.

DXplain also does not understand physiologic processes in diseases or syndromes and provides only a statistical description of diseases. Said Dr. Barnett:

"The system doesn't understand the reasoning that physicians often go through in formulating the clinical explanation, such as, 'Well, if the patient has had a heart attack, maybe he is having heart failure, and if that is the case maybe evidence of edema [abnormally large amounts of fluid] will be found in his lungs.'"

A major problem with DXplain, Dr. Barnett said, has to do with preparation of the database. As many as 30 different physicians have participated in this. One person would describe a disease one way. Another editor would write about a related illness in another way. Since the conditions are linked, one would expect the descriptions to be somewhat similar, but in reality marked differences may be seen in the disease descriptions.

Dr. Barnett said that trying to make a disease description contained in the computer system independent of the editor who wrote about it is something his laboratory continually works on.

Looking on as Dr. G. Octo Barnett obtains DXplain data from a computer are, from left to right clockwise, Senior Programmer Richard Kim, Dr. Marvin Packer, Senior Programmer John McLatchey, and Dr. Edward Hoffer.

Still Learning About Polio Years Later

Thirty-four years have passed since Dr. Jonas Salk introduced a vaccine that reversed a rampant incidence of polio in the United States, but only now are physicians beginning to realize the extent of the disease once known as the Great Crippler.

Neurophysiological tests of former polio patients who seemingly recovered only to redevelop physical weaknesses many years later have demonstrated that the old virus often had a wider distribution in the body than first thought.

"Again and again, we see someone who had polio in one leg and now is getting a new weakness not only in that leg but in the other leg as well and maybe also in an arm," said Dr. Robert H. Brown, Jr., an MGH neurologist who specializes in neuromuscular disorders.

"Our studies have provided very good evidence that many of the patients originally had been stricken with polio up and down their entire spinal cord and just never knew it.

"Examiners have detected what apparently had been mixtures of paralytic and non-paralytic disease literally in the same cord, sometimes only a few centimeters apart. In a sense, certain limbs were vulnerable all these years to what we now refer to as the post-polio syndrome [PPS]."

Of some 250,000 polio survivors in this country, thousands are being plagued by a second round of neurological deterioration. Many have returned to wheel chairs or put on braces again.

The patients—all of whom once had paralytic polio—complain of such symptoms as muscle weakness, pain in muscles and joints, general fatigue, difficulty breathing, and an intolerance to cold.

"While post-polio syndrome is considered a benign illness," Dr. Brown said, "it can be life-threatening in people who develop respiratory problems."

In general, even though the syndrome may alter a person's life-style, it progresses very slowly. *Early intervention with rehabilitative measures often can minimize the effects of the malady. But so far there is no cure.*

The origins of PPS remain somewhat obscure, but increasingly physicians believe that the major problem is one of premature aging of the motor nerves which provide energy to muscles. *There is no evidence in PPS patients of any reactivation of their old polio virus.*

When polio virus strikes, it infiltrates the body through the nose or mouth, travels to the intestines where it enters the blood stream, and then, for some unknown reason, heads for the motor nerves, or neurons.

The virus works its way up the nerves to their control center, a cell body in the spinal cord, and produces an inflammation which, if active enough, destroys the cell. In this way, the number of motor nerves available to generate bodily movement can be decimated.

Surviving nerves try to compensate by taking over the function of the destroyed ones. Dr. Brown estimated that in many of today's PPS patients motor nerves have up to 20 times the number of muscle fibers to stimulate than they normally would and, as a consequence, appear to be undergoing some kind of accelerated aging.

Motor nerves and muscles normally weaken with age, but in healthy people they are present in such abundance that their decline would not reach a critical level until long after an entire life span.

Post-polio patients do not enjoy such a safety factor. Destruction of their nerve cells by the virus combined with subsequent overwork and premature aging of remaining neurons have allowed only about 30 years to elapse before illness returned.

Dr. Brown, who has seen some 90 PPS patients since 1984, said that criteria for the diagnosis include a clear-cut history of paralytic poliomyelitis in at least one limb, a recovery of function with stability for a substantial number of years, and the exclusion of certain other disorders as possibilities.

Among these are myasthenia gravis, which led to the death of Aristotle Onassis, and amytrophic lateral sclerosis (Lou Gehrig's disease).

Extreme fatigue in PPS is very suggestive of myasthenia gravis, in which brain signals become blocked between nerves and muscles, but a careful further assessment can rule out this disorder.

Unlike PPS, Lou Gehrig's disease usually affects nerves both in the brain and spinal cord. The illness, typically striking males in mid life, causes death in two to four years.

"Also, in Lou Gehrig's patients, there is an active unplugging of motor nerves from muscles everywhere you look," Dr. Brown said. "In post-polio syndrome, that is much less common. We do not require active denervation to make a diag-

(Concluded on Page 8)

DXplain may have only limited value to the specialist working in his own area of expertise. The system simply does not have the experience or the competency that the expert does.

However, a specialist may encounter a disease in his field that has very atypical findings and might wonder if another disease process is also present. DXplain may be valuable in such a situation.

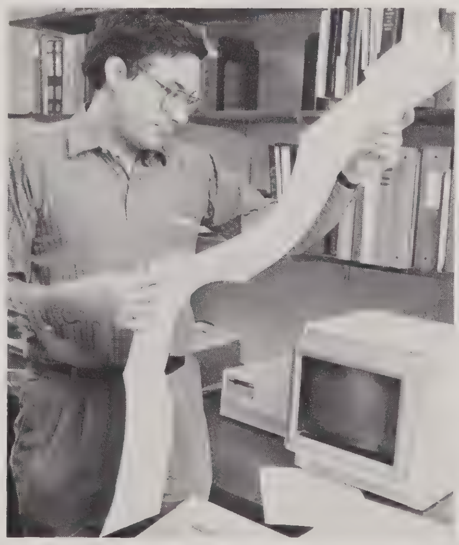
The strengths of the computer system, which was three years in the development stage before its introduction, lie in internal medicine and family practice.

Dr. Barnett thinks DXplain will always be relatively weak in specialized fields. In dermatology, for instance, seeing a skin rash is much more helpful than having a description of one. DXplain would probably be most useful in analyzing dermatologic conditions characterized by changes in normal body function.

In orthopedics, the question might be, "Is it a fracture or a sprain?" Visual observations and X-ray findings can usually furnish the answer to that.

In addition to funding from the AMA, the Laboratory of Computer Science used its own financial resources to help develop DXplain. The National Library of Medicine supports postdoctoral Fellows who train in the Laboratory, and the Hewlett Packard Company has furnished equipment.

Members of Dr. Barnett's team include Drs. Edward P. Hoffer, Marvin Packer, Jon Hupp, Donald Studney, Christopher Cimino, and Peter Elkin, as well as Kathleen T. Famiglietti, Richard Kim, and John McLatchey. ■



A DXplain response, such as one being scanned by Dr. Christopher Cimino, can run several pages long.

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Many Post-Polio Patients Find Relief

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nosis of the syndrome."

A few years ago, many PPS patients were told that their new weakness could not be related to their old polio because active denervation was absent.

One reason why the criteria for PPS changed was that two-thirds of such patients examined in the MGH's Clinical Neurophysiology Unit, directed by Dr. Bhagwan T. Shahani, did not have such unplugging of nerves from muscles, yet did exhibit significant new deterioration of function.

In June 1987, Dr. Brown helped to establish a Post-Polio Syndrome Clinic in the nearby Spaulding Rehabilitation Hospital, a major MGH affiliate. Spaulding's Director of Inpatient Physiatry (Rehabilitation Medicine), Dr. Nimet Oruc, heads the clinic team, which also includes a physical therapist, occupational therapist, social worker, and an orthotist (a bracing specialist).

At first, PPS patients were seen one afternoon a month. Later, the visiting hours were changed to twice a month. Now, the clinic is open once a week.

Dr. Brown maintains a close association with the Spaulding clinic, as do two other MGH specialists, Drs. Frederick Mansfield of Orthopedics and Leo C. Ginns of the Pulmonary Unit.

PPS patients can be helped in a number of ways. For some individuals, gait training has halted the overuse of muscles, thereby resolving joint pain and progressive muscle weakness.

When people have significant leg weakness, for example, they seek stability by swaying back the knee, or walking back on it all the way. Over several years that wears down the knee joint, produces intense pain, and further accelerates muscle loss. By correcting the habit, ambulation can sometimes be sustained for years.

One of Dr. Brown's patients had a job in a pharmacy which required her to be on her feet all day. She moved about with crutches but with ever increasing fatigue. On the doctor's advice, the patient took early retirement to get off her feet more. The improvement seen in her energy level was amazing.

It's still too early, however, to know the long-term benefits of unloading excessive weight on weakened limbs, whether by splinting, use of a cane or crutch, wearing a leg brace, or just resting.

Swimming and mild stretching exercises can help to keep the body limber.

For patients with early respiratory failure, Dr. Brown said that ventilators are available for use in the home. "A few hours of respiratory assistance at night to give the chest muscles a rest can often restore nearly normal function the next day," he said.

There is very little in the way of pain-relieving medication that one can offer PPS patients. Dr. Brown, an Assistant Professor of Neurology at Harvard Medical School, said the usual anti-inflammatory drug regimens do not seem to work on these patients, and he tries to avoid opiate drugs.

What does the future hold for PPS patients? Dr. Brown believes that the fatigue symptom may stem from "some physiologic phenomenon such as the release of excessive amounts of a sleep-inducing substance into the spinal fluid. It may be possible to devise assays for such factors."

Years ago, one did not know how to assay for myasthenia gravis. Such sufferers were often labeled as malingerers. Subsequently, a specific antibody was discovered which points to the presence of the disease. Such a test for PPS might also be accompanied by a treatment.

At the MGH's recently opened Neuroscience Center at Boston's Charlestown Navy Yard, the Cecil B. Day Laboratory for Neuromuscular Research, which Dr. Brown directs, has given high priority to finding the gene for familial Lou Gehrig's disease.

"About 15 or 20 percent of the people with Lou Gehrig's disease have the familial type," Dr. Brown said. "If we could find the mechanism whereby that particular gene fails, we may gain enough insight into motor neuron pathology to think of new ways of treating post-polio syndrome."■

Dr. Robert Brown examines Eleanor Pelrine who recovered from polio suffered at the age of 1 only to redevelop weakness in the same leg three years ago. She also experienced deterioration of function in an arm for the first time.

MGH
News

Massachusetts General Hospital, Boston, Massachusetts

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A Bone Disorder of Later Years Can Begin Early

MANY WOMEN stricken with osteoporosis after menopause may actually have had the stage set for the bone-thinning disorder when they were in their teens.

Osteoporosis, which makes bone porous, brittle, and prone to fractures, affects as many as 20 million Americans over 40. Women become especially vulnerable after menopause since their loss of the hormone estrogen and their generally small bone structure customarily lead to a rapid decrease in bone mass (*MGH News,* November 1986).

Recently, MGH investigators looked at changes in bone densities among women who, for one reason or another, stopped having menstrual periods during adolescence.

Dr. Anne Klibanski, an MGH specialist in neuroendocrine diseases, said that "there seems to be a critical time in bone development when an onset of amenorrhea (lack of menstruation) can have not only a profound impact on the bone densities of women at a young age but potentially can also affect women later in life."

Stress, exercise, dieting, weight loss, and anorexia nervosa, a psychiatric disorder in which an overwhelming desire for thinness leads to an aversion to food, are among conditions which can precipitate the amenorrhea, loss of bone mass, and osteoporosis.

Studies indicate that up to 2.5 percent of America's young women have missed menstrual periods for at least six months. Stress, exercise, dieting, weight loss, and anorexia are believed responsible in about one-fourth of the affected population.

Last month the *Journal of Clinical Endocrinology and Metabolism* published the findings of an MGH study which dealt with osteoporosis in women who had anorexia.

The investigators, led by Dr. Klibanski, compared the effects of anorexia on bone in 26 women ranging in age from 15 to 42, using both CT (computed tomography) and a bone-measuring device called an absorptiometer.

"The study shows," she said, "that adult women who developed anorexia in adolescence had much lower bone densities than women who developed anorexia in adulthood even though both groups missed menstrual periods for the same length of time."

No prior study of bone loss in anorexia had focused separately on women whose illness developed prior to their attaining peak bone mass, usually in the late teens or early 20s.

"Not only are we looking at loss of established bone," Dr. Klibanski said of the ongoing study, "we're also looking at an apparent failure to form normal bone at a very key point in skeletal development. That has important implications in terms of what happens to these young women as they go through all of their premenopausal years and finally enter the menopause.

"I think it's also important because ano-

(Continued on Page 2)

Why Are Some People Always Tired?

EVERYBODY BECOMES tired at one time or another— too weary to rise from bed, dress, go to work, or perform chores around the house.

The lack of energy and drive can usually be ascribed to an illness, physical overexertion, or mental strain.

In time, when the illness has run its course, the muscles, nervous system, and cardiovascular system have settled back to normal, or the worry has subsided, the tired feeling goes away.

With some people, however, the scenario differs. Tiredness may set in without any apparent cause and continue, not just for days or weeks, but sometimes for months, even years.

"It is interesting to note," said Dr. Morton N. Swartz, Chief of the Infectious Disease Unit at the MGH, "that patients who have what is known as the 'chronic fatigue syndrome' usually do not lose weight, become bed-ridden, or follow a progressively downhill course."

Still, the doctor emphasized, the affliction can be very debilitating to the patients because they no longer feel able to do many of the things that they had been used to doing, and they do not know why.

(Continued on Page 6)

INSIDE

Page 4: Speeding the Delivery of Emergency Care

Page 6: A Bladder Disease That Affects All Aspects of Living

EDITORIAL:

From Bloody T-Shirts to Tuxedo

ABOUT HALF THE PEOPLE ADMITTED to the MGH enter through the Emergency Department. They come via ambulance or private car—sometimes by public transit. They drive anything from a battered 1960 subcompact to the largest, latest Mercedes. Their attire may be torn, bloodied T-shirt and jeans, or a tuxedo, and their skin color ranges over the human possibilities. A stab wound in the heart or a cut finger, cardiac arrest or influenza ... The possibilities would stretch the imagination. Like the 12 year old Little Leaguer who in May of 1962 arrived with his arm severed in an accident. He assumed that doctors would "sew" the arm back on. And they did.

In any hospital the patients who populate the Emergency Department reflect the community. In an urban metropolis they represent a microcosm of American society. Regardless of their background or severity of their health problem, they all share one universal need: attention to whatever brought them to seek help.

When the Emergency Department is as busy as the MGH's, both the benefits and difficulties multiply. With more than 200 emergency patients a day, the MGH team sees just about every conceivable challenge. That experience, coupled with extraordinary training, produces the ability to frequently judge in a glance the nature of the problem and the medical solution—if there is one. Well-honed skills often are needed to translate that recognition to reality and in the process to give to the patient with the most fragile connection to life that person's best opportunity to live. For some problems—like that of a patient whose heart had stopped en route to the MGH—the instant action would require a team of 6 experts, each automatically taking a preassigned position and task, each orchestrated with the precision of a great symphony. But the stakes are a million times greater, the possibility of saving a single human life.

On the nether side sits the patient with a cut finger. The bleeding has long stopped, and the patient needs patience. No emergency here. The stab victim, the pedestrian smashed by a car, the child who fell from a third story window—and many others—all take precedence. For the man with the cut finger, the wait seems interminable, and sometimes it is.

Enter Dr. Alasdair Conn, a remarkably talented emergency surgeon with a mission. Dr. Conn wants to shorten the wait and improve the experience of that man with the lacerated finger. As an article on Page 4 describes, Alasdair Conn is completing his first year as Chief of Emergency Services. He is at once compassionate and superbly capable in the best MGH tradition. During that year he has already instituted a number of changes and fully intends to effect more. The man with the cut finger will still have to wait while life-threatening emergencies and other more serious problems are addressed.

At times that wait will be a lot longer than either the patient or the Emergency Department would like. But already an outstandingly capable emergency team has made improvements. With Dr. Conn about, one senses the progress will continue.

Early Bone Loss

(Continued from Page 1)

rexia is certainly increasing in prevalence. We're seeing younger and younger girls with the illness."

The MGH physician, an Assistant Professor of Medicine at Harvard Medical School, told of a 14-year-old girl who at five feet tall weighed 150 pounds. At the urging of friends, she went on a diet, quickly developed anorexia, and entered the hospital nine months later weighing only 86 pounds. She also had not menstruated for five months.

"She had developed amenorrhea at a time when most pubertal girls are not only entering into normal menstrual function but also are going through a growth spurt," said Dr. Klibanski.

"A year after she was first seen, the young patient's bone density had decreased by an impressive 25 percent. Although her weight is now above 100 pounds, she is still amenorrheic. We have decided to give her estrogen replacement therapy, even though such therapy is usually reserved for postmenopausal women."

Another patient in the study, conducted in the MGH's Mallinckrodt General Clinical Research Center, of which Dr. Klibanski is Associate Director, was a 21-year-old woman who developed anorexia at 18.

She had begun dieting although at 130 pounds she was only five pounds overweight and quickly fell to 64 pounds. By the time she came to the MGH three years later, she had regained her weight but had not resumed her menstrual periods. In addition, her bone density

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PHOTOGRAPHS
Page 4, left, courtesy of Dr. Robert Novelline
Page 8, courtesy of Dr. Alasdair Conn
All others, Myron Daniels

was so severely decreased that she already had evidence of clinical fractures, which can result in back pain, difficulty standing for any length of time, and even a shortening of height.

"Her bone mass," Dr. Klibanski said, "was comparable to what one would encounter in a post-menopausal woman with very severe osteoporosis which had led to fractures."

Although this patient's anorexia has been conquered in the sense that she has regained normal weight, feels better, and has resumed work, her skeletal mass remains severely reduced. MGH studies have shown that much of the impact caused by amenorrhea on bone density may not be reversible even if normal periods resume.

The published anorexia report, co-authored by Dr. Beverly M. K. Biller, Technician Velia Saxe, and Dr. Klibanski of the Department of Medicine, and by Drs. David B. Herzog of Psychiatry, Daniel I. Rosenthal of Radiology, and Susan Holzman of the Children's Service, pointed to the role that stress can play in the malady.

The report cited significantly higher levels of the hormone cortisol in the anorexia patients than are found in normal women. Produced by the adrenal gland, cortisol increases in times of physical and emotional stress and acts on many different parts of the body, including bone.

"In addition to the significant contribution of hypogonadism (decreased ovarian activity)," the journal article said, "the cortisol excess that occurs in anorexia patients may also contribute to the development of osteoporosis in these patients."

Dr. Klibanski's studies of young amenorrheic women began nine years ago. Although estrogen deficiency was long known to be a key factor in the development of post-menopausal osteoporosis, the doctor wondered why many women were entering menopause with very different bone densities.

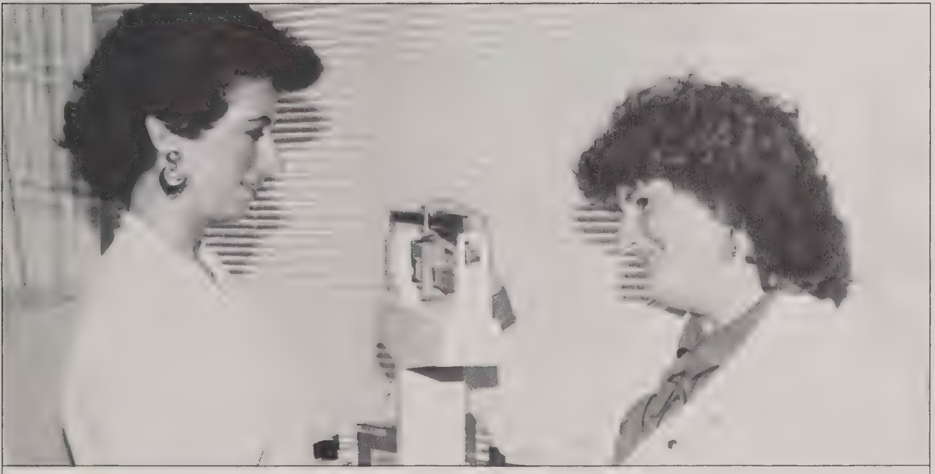
Margery Adler of Newton, who had anorexia nervosa for several years, receives advice on proper nutrition from Ellen Williams, a Research Dietitian in the Mallinckrodt General Clinical Research Center.

Dr. Klibanski and her associates first looked at a group of women in their 20s and 30s who had a condition called hyperprolactinemia.

Prolactin is a milk hormone that increases during pregnancy and facilitates nursing. The women under study were not pregnant, however. They had a pituitary disorder—a small, benign tumor or a hormonal imbalance—that led to an overproduction of prolactin and, as a consequence, a shutting off of menstrual periods causing reduced estrogen levels.

"This was really the first demonstration that young women with functional amenorrhea were also susceptible to osteoporosis," Dr. Klibanski said. "We found in the women with hyperprolactinemia that once their prolactin level was treated, normal menstrual function could be restored."

Since the study involved adults whose loss of periods occurred after their bone structure had already matured, the MGH researchers decided to extend their work to women with amenorrhea brought on by eating disorders. Many in this group developed their problems in their teens.



▲ Ms. Adler has her weight checked by Velia Saxe, Senior Technician in the Mallinckrodt Center.

Dr. Klibanski said the variability in their degree of bone loss is tremendous. Part of that, she suspects, can be attributed to the severity of the hormonal changes that occurred during their time of critical bone development, and part may deal with genetic predisposition.

"I think the development of amenorrhea in these young women is often ignored as not a great problem because most are not yet in a reproductively active group," Dr. Klibanski said. "But I think what we're realizing is that the lack of normal gonadol (ovarian) functioning at their young age may in fact be even more critical than what happens in later years.

"What we're trying to determine now is whether or not those girls ought to be receiving estrogen replacement therapy even though they are as young as l5."

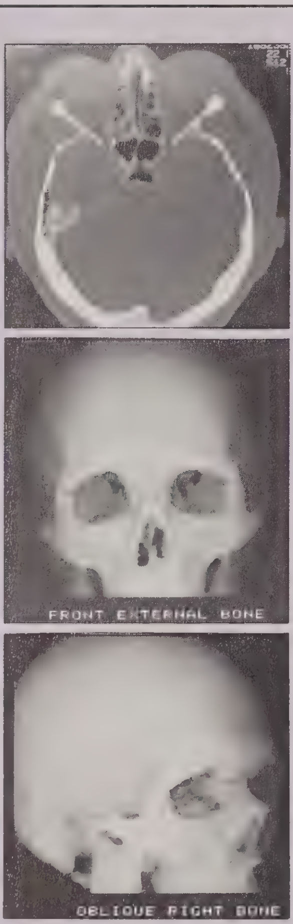
The general guideline for physicians dealing with an eating disorder causing amenorrhea has been to reverse the psychological problem and encourage the patients to gain weight. Presumably, the periods will return to normal. But Dr. Klibanski emphasized:

"This therapy is not always successful. Many of these women remain amenorrheic for many years."

She said that even as one attacks the fundamental psychological problem, one must also address the damaging effects of estrogen deficiency. *And in those young women who do not want to take estrogen because they prefer not to have menstrual periods again, a search must be conducted for another means of protecting bone.* ■

The MGH Emergency Department:

Taking Steps to Speed Up Service



A new CT scanner in the Emergency Department not only displays images in conventional horizontal "slices," such as a part of the brain shown at top, but can also show an entire skull in three dimensions with views possible from various angles. The scanner is also one of the fastest in the country.

THE MGH EMERGENCY Department (E.D.) is moving in a variety of ways to speed the processing, diagnosis, and treatment of the many patients who come through its doors.

The E.D. presently accommodates some 200 patients daily, about 250 on a busy day. They arrive with conditions that range from minor to life-threatening.

Since priority must be given to patients needing immediate help, others must wait. Some of these patients have complained of waiting two to three hours before a physician saw them.

Dr. Alasdair K. T. Conn, who became the hospital's Chief of Emergency Services last April, has reported a series of changes designed to make the E.D. function more smoothly and efficiently.

A major reason for delays in treating patients has been a need to await radiological tests. This month, the E.D.'s Emergency Radiology Section began using a state of the art CT (computed tomography) scanner that not only greatly accelerates the output of diagnostic images but produces them in much finer detail than before.

"The Radiology Department has installed a CT scanner that is one of the fastest in the country," Dr. Conn said. "It can make an almost instant three-dimensional representation of a part of the body. The detail is so fine that it assures a very accurate diagnosis."

A complete CT scan used to take as long as 40 minutes. The new scanner takes only 10 to 12 minutes and involves less radiation than before.

With the new capability, it is possible to tell rapidly whether or not a person who arrived in the E.D. with a head injury, for example, had developed a lesion inside the skull. With such an abnormality, the patient would be admitted to the hospital.

If a neurological examination with CT backup showed nothing abnormal, the patient could be discharged from the E.D. after routine treatment for the head injury.

In another attempt to speed care, patients will soon undergo preliminary assessment of their condition (triage) before having to see a registration clerk.

"It is so important to relieve the anxiety of the patient," said Dr. Conn. "Before the individual is asked for his name, address, and telephone number, a doctor or nurse will pose such questions as, 'What is the problem? Where is the pain? What can we do to help you?'"

When Dr. Conn arrived at the MGH after three years on the surgical staffs of Boston's City and University Hospitals (the last year at University Hospital as Chief of Trauma), his first goal was to have experienced staff physicians work full-time in the E.D.

Today, an attending physician who is board-certified in emergency medicine, internal medicine, pediatrics, or surgery is assigned to each 12-hour shift to help set up systems of care for each arriving patient, many of them referrals from other hospitals, and to supervise the E.D.'s residents.

"We needed this capability," Dr. Conn explained, "because the residents, or house staff, rotate so frequently. A surgical resident may spend only one month in the Emergency Department, then move on to his next rotation. Part of that time is necessary just to acclimatize the individual to how the E.D. functions."

Dr. Conn hopes to move up to greater coverage by attending physicians during particularly busy daylight shifts.

The Emergency Services Chief assigns himself to the 12-hour tours of duty, including on weekends. "I don't handle as many shifts as others do because I have added responsibilities," he said, "but I couldn't sit here and be an administrator all the time."

Completion of a 24-story building currently under construction at the MGH will expand the E.D.'s capabilities from its 15,000 square feet of space on the first floor of the White Building to about 25,000 square feet on the same floor.

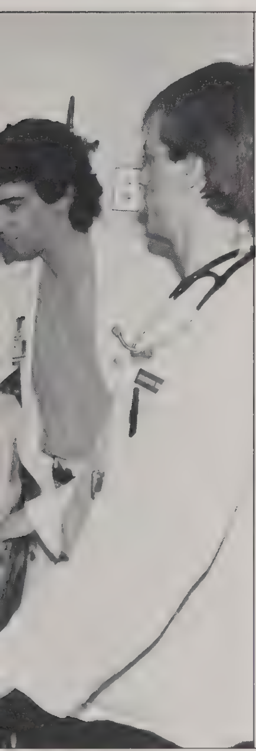
By and large, the new area, which will

have its own ambulance entrance, will care for patients with trauma or illnesses requiring high-priority attention.

The existing E.D. space will be totally renovated and turned into an area for pediatrics and for the rapid management of patients who present relatively minor complaints.

The design for the expanded E.D. eliminated its 18-bed Overnight Ward where patients were sometimes held for 24 hours or longer to check for response to a treatment, such as for a concussion, or to permit emergency X-ray studies prior to possible surgery.

Enhanced radiological capability eliminated much of the need for the Overnight Ward. In addition to the improved CT imaging, the new E.D. will have a room for ultrasound tests and possibly an additional X-ray room.



Emergency Department Attending Physician William Daley, left, discusses a patient, Niki Talianis of Boston's Jamaica Plain, with Dr. Sean Harper, an intern, and Christopher Senkowski, a third-year Harvard Medical School student.

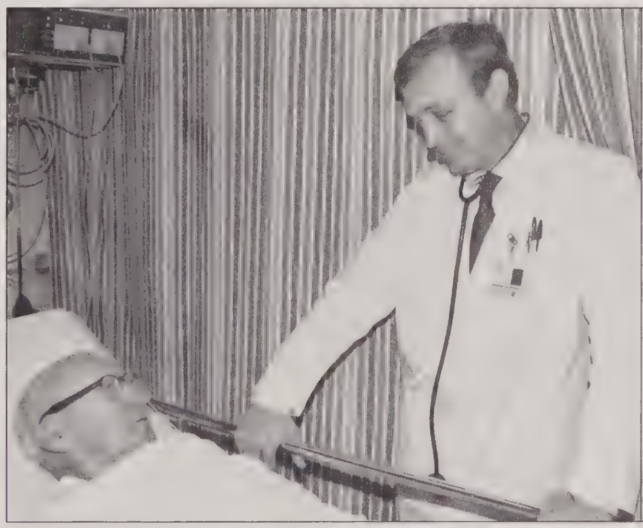
"We have tried to ensure not only more prompt processing for our existing caseload but also an ability to handle even more patients," Dr. Conn said. "The Emergency Department now receives about 72,000 patient visits a year. In the future, I would hope that, if need be, we could manage up to 80,000."

Besides being head of Emergency Services at the MGH, Dr. Conn wears another hat as Executive/Medical Director of Boston Med Flight, a helicopter service available around the clock to transport critically ill or injured patients from outlying areas to hospitals with special capabilities.

Since its inception in June 1985, Med Flight has carried out 1,700 missions spanning much of New England. More than 95 percent of the patients were taken to hospitals in Boston.

A non-profit organization, Med Flight's costs are underwritten by the MGH and five other Boston centers, including University Hospital, City Hospital, Brigham and Women's Hospital, New England Medical Center, and the Massachusetts Eye and Ear Infirmary.

Med Flight, however, has lost money since its inception and from a financial viewpoint has been struggling to stay alive in a time of severe fiscal constraints among the Boston teaching hospitals. Although these constraints necessitated a paring of expenses at the MGH, including some personnel cutbacks, the hospital's Emergency Department was not affected by those layoffs.



Dr. Alasdair Conn checks on U.S. District Court Judge Frank J. Murray of Boston who collapsed on a Reno-bound airliner. He was returned to Boston, taken to the MGH's Emergency Department, and held for observation.

As Anne Field of Marblehead arrives in the Emergency Department with a numbness of her left side, Susan O'Leary, RN, quickly obtains necessary information.

An emergency transport system similar to Med Flight operates from the University of Massachusetts Medical Center in Worcester. That helicopter and the one based in Boston provide backup support for each other six to eight times monthly.

Dr. Conn came to Boston from Maryland to organize Med Flight along the lines of a similar emergency helicopter service in that state which handled nearly 3,000 patients annually.

He had become heavily involved in Maryland's air evacuation program after helping to establish Baltimore's Shock Trauma Center (The Maryland Institute for Emergency Medical Services Systems). Part of the University of Maryland, the center is also the emergency medical services arm of the state.

Dr. Conn's affiliation with the trauma center was intended initially to give him time to decide on a specialty to follow in medicine.

He had earned his bachelor's degree, summa cum laude, in biochemistry from

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A Bladder Disease That Affects Every Aspect of Living

PHYSICIANS WERE FIRST introduced to the disease in 1907, but today—more than eight decades later—they are still barely acquainted.

Difficult to diagnose...often unresponsive to treatment...impossible to cure...

That is how doctors describe interstitial cystitis (IC), a painful affliction of the bladder that can cripple a person's ability to sleep, work, or socialize.

Although not life-threatening, IC in a severe form is devastating because it imposes a need to urinate almost every 30 minutes, day and night.

A healthy bladder in an adult holds about 12 ounces of fluid. The urge to urinate develops when the bladder contains 8 to 10 ounces. In an IC patient, whose bladder is inflamed, the presence of only 1 or 2 ounces of urine signals the brain for relief.

Such an individual cannot go anywhere unless a lavatory is near. There is not enough time to shop, commute to a job, or see a movie before urination becomes a must. Without facilities nearby, urinating will occur involuntarily.

The debilitating physical symptoms of the illness frequently lead in time to such intense emotional distress that psychiatric as well as medical intervention is required.

Affecting ten times more women than men, usually between the ages of 35 and 55, IC has been termed rare, but no one really knows its frequency.

"Many diseases of the bladder, including bacterial infection and cancer, can mimic interstitial cystitis," said Dr. Barbara Bassil, an MGH urologist who sees a number of IC patients. "Diagnosing interstitial cystitis first requires the elimination of all other possibilities. There is no specific bladder test, blood test, or even biopsied tissue sample that can provide the diagnosis by itself."

Dr. Bassil said that IC occurs in cell spaces (interstices) between the epithelial, or outer, lining of the bladder and a deeper muscle lining. Over the years many theories, none proven, have been advanced as to the cause of the disorder. As for treatments, some have been effective, but only for a limited time.

Hope for the development of universally effective methods of diagnosing and treating IC has risen in just the last few years as publicity on the disease has generated increased interest among doctors and the general public.

Much of the publicity stemmed from efforts of the Interstitial Cystitis Association to raise money for research. The organization was created in 1984 by two sufferers of the disease, Dr. Vicki C. Ratner, a New York physician, and Dr. Paula Harbison, a podiatrist, of Irvine, Calif. Their group now has more than 5,000 members.

After years in which no researchers even applied to the National Institutes of Health for study grants, the N.I.H. in 1987 announced seven awards totaling $1,200,000.

Dr. Bassil spoke of the difficulties that IC patients have experienced in seeking relief: "Most patients feel quite healthy, unaware of any bladder problem, before the frequent and intense desire to urinate

▲ *In the MGH Hematology Laboratory, Teaching Supervisor Debera Grzybek tests a patient's urine sample for a possible urinary tract infection. It is one of the first conditions that doctors rule out in a patient suspected of having interstitial cystitis.*

Chronic Fatigue

(Continued from Page 1)

Dr. Robert T. Schooley of the Infectious Disease Unit added that by and large patients with chronic fatigue syndrome had been busy, involved, productive individuals.

"When such people complain that at a particular point in time, for no apparent reason, they suddenly could no longer function and it's been like that ever since," Dr. Schooley said, "the unexplained turn-of-events lend credibility to the syndrome as a legitimate entity.

"The patients feel that their symptoms are very real. The fact that we don't know what causes these symptoms doesn't mean the symptoms don't exist."

Public attention was drawn to the syndrome by a series of medical journal articles published between 1982 and 1985. They reported that subtle immunologic abnormalities and unusual profiles of antibodies to a problem known as Epstein-Barr virus (EBV) are unexpectedly common in chronic fatigue syndrome.

EBV is responsible for infectious mononucleosis in 80 percent or more of "mono" patients (*MGH News*, November 1978). The disorder is characterized by fever, sore throat, abdominal tenderness, fatigue, and general malaise.

Because of the journal reports, people began to refer to chronic fatigue syndrome as chronic mononucleosis.

Last December 29th, a team from the National Institutes of Health (N.I.H.) reported in the *New England Journal of Medicine* on a study of the drug acyclovir develops. They would go to their primary physician or to a walk-in clinic and usually be told that they probably had a urinary tract infection.

"The doctor would prescribe an antibiotic to no avail. A different antibiotic would then be given, but still no relief. Laboratory test results would prove negative."

Eventually, perhaps even after being advised to seek psychiatric help because "it's all in your head," the patient consults a urologist.

In the hospital, the urologist might first use an instrument called a cystoscope to visualize the bladder and rule out any conditions mimicking IC.

Then with the patient kept barely awake under a very light general anesthetic, the bladder is filled to capacity with water to determine if the individual feels any pain. The procedure would cause no pain to a healthy person.

After the water is removed from the bladder, its lining is carefully examined. The urologist may see tiny hemorrhages and cracks in the lining, characteristic signs of IC, but even this is not proof of the illness. Other bladder disorders can produce the same abnormalities.

When Dr. Bassil sees these hemorrhages and cracks, she may fill the bladder beyond capacity, leave it filled for several minutes, then drain it, and awaken the patient.

"Overdistention of the bladder doesn't help everybody," she said, "but many patients do experience symptomatic relief lasting anywhere from three months to a year."

Failure of overdistention to ease symptoms may be followed by trying the anti-inflammatory drug dimethyl sulfoxide (DMSO), the only chemical agent federally licensed for IC treatment.

Drugs given in hope of increasing the capacity of the bladder and decreasing its tendency to empty often have troublesome side effects.

Other drugs are being tried, with varying success, on the basis of different theories about what causes IC. Theories include one that attributes the disease to

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in the treatment of 24 patients with chronic fatigue.

Although acyclovir is known to have an effect against EBV, the new trial showed that improvement occurred as frequently among fatigue patients given an inactive, non-medicated agent as among patients on acyclovir.

Dr. Schooley, who has studied Epstein-Barr virus closely for a number of years, said the acyclovir trial increases the likelihood that EBV and chronic fatigue syndrome are not related, but he added:

"It doesn't prove conclusively that EBV doesn't play a role in some patients with the syndrome."

One of the most laudable aspects of the N.I.H. study, Dr. Schooley said, was the involvement of controls, making possible a comparison of patient outcomes.

"There are some in the community who say the chronic fatigue syndrome is due to a yeast infection in stool," Dr. Schooley said. "We all have yeast in our stool, but these people are offering desensitization with a yeast extract, expensive diets, and antifungal drugs.

"Sure, some patients will feel better, but it's very important when patients consider some of these fringe therapies for chronic fatigue syndrome that they actually ask what evidence there is that these measures work. Were the experiments adequately controlled? There are very few studies that really address the issue."

Both Drs. Swartz and Schooley stress the need for a better definition of chronic fatigue syndrome. In an effort to narrow the focus, physicians now require that a diagnosis meets two major criteria and six of 14 minor ones.

One major criterion is debilitating fatigue unresolved by bed rest and a reduction of daily activity to less than half of one's normal levels for at least six months. The second major test: the exclusion of other known causes of similar symptoms, such as specific infections, tumors, endocrine disease, or psychiatric problems.

The minor criteria include mild fever, sore throat, muscle weakness, muscular pain, joint pain, generalized headaches, and neuropsychological symptoms.

Dr. Swartz, who is Professor of Medicine at Harvard Medical School, said the study to be done now must start by finding a homogeneous population of patients. By defining the disease and gathering a population that meets the established criteria, the patients could be followed closely while promising new therapies are developed and tried.

In the past, lacking an adequate definition of the illness, he said, investigators have been looking at oranges, apples, and bananas, trying to decide if this virus, that virus, or something else is responsible.

Dr. Swartz believes that psychological aspects of the fatigue syndrome should be studied more intensely. In an editorial in the *New England Journal of Medicine* on the acyclovir study, the MGH physician wrote it is likely that with time this syndrome will prove to have multiple physical as well as psychologically produced causes.

In his editorial, Dr. Swartz cited a number of conditions involving fatigue and weakness in which psychological factors also were found to play a role.

During an epidemic of Asian flu in 1957, recovery was delayed more frequently in a group of patients shown by earlier psychological testing to be depression-prone. Persistence of pre-illness factors resembling fatigability or weakness were usually ascribed as a continuation of the flu infection.

In the 1940s and 1950s, studies were conducted among patients stricken with brucellosis, an infection resulting from exposure to certain bacteria in animal products, to learn why the disease persisted in some of the patients. The delay in symptomatic recovery was found to be related largely to emotional adjustment rather than ongoing infection.

And over the last 35 years, more than 20 outbreaks have been reported of a curious illness given several different names, including Iceland disease, which has involved fatigue, muscular pain, memory loss and depression.

Laboratory findings are almost always normal, but while recovery usually takes place within several months, some patients suffer relapses or persistent symptoms for years.

The best one can do for chronic fatigue patients right now, Dr. Swartz said, is to encourage renewed activity at a gradual pace. Pressure upon an individual who still feels incapacitated should be avoided.

"There has to be one or more reasons for chronic fatigue syndrome, and in time I think we will have a handle on the problem," he said. "There is no black magic in medicine.

"As studies go forward, it's important to reiterate that the outcome of the illness isn't a steadily progressive downhill course. People should not be labeled with the syndrome and led to feel that there is no hope." ■

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Many Theories About Rare Bladder Illness

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the lack of certain proteins in the bladder's epithelial lining. Another blames IC on the release of histamine into the bladder.

Some physicians argue that many IC patients are unable to metabolize certain amino acids—the building blocks of protein—and therefore they should avoid foods high in such amino acids. Dr. Bassil said the dietary role should be limited to avoiding spicy foods, beverages that contain caffeine, and alcohol, all known irritants of the bladder.

When all conventional means fail to relieve interstitial cystitis, urologists turn to surgery.

"We remove 95 percent of the bladder, leaving intact only its base where the ureters, or tubes from the kidneys, are anchored," Dr. Bassil said. "We then fashion a new bladder from a portion of large intestine and attach it to the remnant of the bladder. This is effective in two thirds to three quarters of patients.

"In those who still have disabling symptoms, the only option remaining is to remove the rest of the bladder and perform what we call a urinary diversion. Instead of urinating the normal way, the patient would urinate into a bag worn on the side of the body."

Dr. Bassil, who is also an Instructor in Surgery at Harvard Medical School, said only about 10 percent of IC patients reach the surgery stage.

"Interstitial cystitis runs a gamut from mild to very severe," she said. "It is not stable in its course, or chronicity. The symptoms may wax and wane over a period of years. Many patients can be managed successfully with conservative treatment for a long time." ■

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BOSTON
MedFlight

▲ *Med Flight Over Boston*

Emergency Care Chief Holds Second Role

(Continued from Page 5)

the University of Edinburgh in Scotland and obtained his medical training there as well, being named by the medical school in 1971 as its most distinguished graduate of the year.

His interest in emergency medicine developed when he realized that Maryland had become the first state to organize a program for transporting trauma and other patients wherever in the state they needed to go for specialized treatment.

As medical director of the air evacuation program, Dr. Conn worked with area fire chiefs and in the training of paramedics and other rescue personnel.

In coming to Boston with his wife, Dr. Suzanne Wedel, a critical care specialist at University and City Hospitals, Dr. Conn saw the possibility of devising in New England the framework for a health care delivery system similar to that in Maryland. Built on the excellent medicine for which the Northeast is noted, such a system could become a model for the nation.

"People are coming to realize more and more," Dr. Conn said, "that in their greatest hour of need, when they're having a heart attack or stroke or have just been in a motor vehicle accident, the closest hospital is not necessarily the best for them. They want the hospital that is best staffed and equipped to manage their particular problem."

Dr. Conn sees the health care delivery system of the 21st century being controlled from a central hub, a major medical center linked electronically to other hospitals, clinics, and doctors' offices.

It would have access by computer to a vast array of medical records so that if a patient with a serious condition were being seen anywhere by a physician for the first time, the doctor would be better prepared to decide whether treatment should be given locally or at a more sophisticated center.

"In this way," said Dr. Conn, "the patient is served not by one physician in one hospital but by a whole network of interlinking health care facilities of different degrees of complexity and with different levels of technology." ■

MGH
News

Massachusetts General Hospital, Boston, Massachusetts Vol. 49 No. 4 May 1989

MGH Steps Up Its Magnetic Resonance Programs

IN LATE 1987 when Dr. James Thrall was considering an opportunity to become Radiologist-in-Chief at the MGH, he had a vision that helped him decide to accept.

The then Chairman of the Radiology Department at Henry Ford Hospital in Detroit had felt strongly that magnetic resonance imaging (MRI) was forging new frontiers in his specialty and that this new technology possessed a vast untapped potential for advances in health care.

The MGH helped to pioneer the development of MRI and was the first hospital in the nation to establish an MRI diagnostic and research program. So rapid was the growth of the MGH program, however, that space constraints gradually limited further development at the hospital.

"The MGH was organizing a facility in Charlestown to carry forward major scientific efforts on a broad front," Dr. Thrall said, "and I saw a unique chance for the magnetic resonance program to not only expand but do so in a world-class environment."

Dr. J. Robert Buchanan, General Director of the MGH, recognized the need for an MR center at Building 149 in the Charlestown Navy Yard. Vincent D. Cucchiara, Vice President for Program and Facilities Development, moved forward with plans to develop an 18,000 square foot area for Radiology.

Last month, only a little more than a year after he formally succeeded Dr. Juan M. Taveras, who retired after 16 years as MGH Radiologist-in-Chief, Dr. Thrall saw his vision come true.

The MGH opened in Charlestown an

(Continued on Page 2)

Cancer Center Gains Global Attention

SINCE EXTENDING its research to large new quarters a year ago, the MGH Cancer Center has taken on an international appearance.

Close to 40 scientists now staff the center's new research unit in the Charlestown Navy Yard, only a 10-minute drive from the hospital's main campus.

In addition to being recruited from various parts of this country, the MDs, Ph.D.s, and MD-Ph.D.s, who have joined in the MGH's battle against cancer, come from France, Germany, Italy, Holland, Israel, Turkey, India, Japan, the People's Republic of China, and Taiwan.

The researchers represent such needed specialties as cell biology, immunology, molecular genetics, and virology. Soon experts in basic processes of transplantation will be recruited to the staff.

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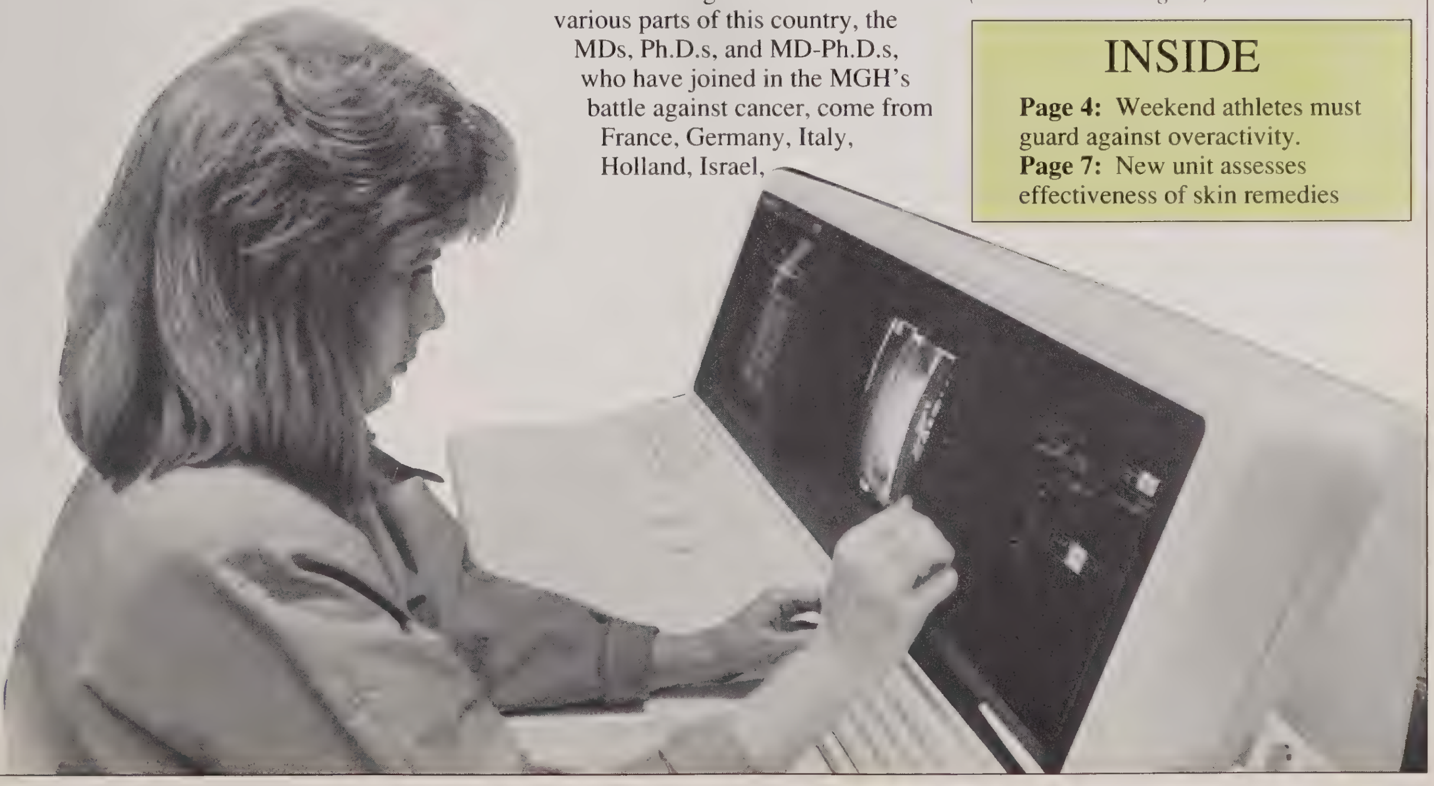
INSIDE

Page 4: Weekend athletes must guard against overactivity.
Page 7: New unit assesses effectiveness of skin remedies



EDITORIAL:

The Ambiguities of Funding

HOSPITAL FINANCES are among the more difficult areas for the public to understand. Especially so with hospital costs. Even the news media often become confused by the complexities. Both the public and many reporters are also bored by the topic except as it relates to their family's health care. Editors and producers have been known to yawn when they read an article on the subject.

For these and other reasons, the stories that do appear tend to be negative ones. Everyone can relate to an article about medical costs being too high or iniquitous. It is the explanation of "why" that is often restricted to several global sentences.

This issue of the *MGH News* provides an example of a confusing issue. A Page 1 article describes the hospital's opening of a new magnetic resonance imaging (MRI) center. Any patient who has had to wait a week or more to undergo an MRI scan can appreciate the need for such a center. Yet only a few weeks ago the hospital announced that federal and state fiscal constraints were severe enough to compromise some nonpatient-care activities. Eliminated were such items as weekend evening meals in the general cafeteria for visitors and employees. (A bank of vending machines would have to substitute). A shuttle bus between the MGH and the hospital parking lot near North Station would no longer operate for patients and employees during daytime hours, etc.

If the loss of these and other amenities was required, how could the hospital follow through on plans to build a new imaging center in leased property at Charlestown? First of all a major purpose of the center is research. For that use federal research funding is providing $425,000 a year.

Is it not possible to use some of the research funds to cover amenities like weekend suppers and the daytime shuttle bus from near North Station? No. Whether they are derived from the federal government, private foundations, or industry, research funding must be used for the specific investigational purpose for which it was provided. The same holds true for money donated for the hospital's building program. Even if the administration were otherwise moved, they must use for two replacement structures (one months away from completion, the other not yet underway) whatever money was donated for that purpose.

What about endowment money? Almost all such gifts are legally restricted to specific uses like the one established in 1926 by Mary R. Richardson for the prevention or cure of tuberculosis. Even in such cases, most of those funds limit their use to interest earned from the gifts. That is why even such a traditional and honored institution as the MGH can be severely compromised by the governmental forces that are constraining hospitals in states like Massachusetts and New York at the very time that urban centers are being asked to treat increasing numbers of patients with costly-to-treat diseases like AIDS.

MRI Programs

(Continued from Page 1)

Imaging Center which can more than equal the 4,000 MRI tests already administered yearly at the main MGH campus.

Directed by Dr. Thomas J. Brady, the unit also conducts an MR education program and engages in a broad range of MR research projects. *The research funding includes a program project grant from the National Institutes of Health that will provide $425,000 a year for three years.*

Dr. Thrall anticipated having about 10 full-time staff personnel assigned to MR imaging, 50 to 70 specialists for research, and several dozen MGH house officers, Fellows in Radiology, and other temporary personnel rotating through the center.

Open for MR imaging from 7 a.m. to 11 p.m., Monday through Saturday, the center is an effective response to ever increasing demands for diagnostic studies by MR. Until now there has been a waiting list for MR procedures.

Mrs. Mary Perdikes, Administrative Director of the Imaging Center, said the new operation should expedite testing and assure referring physicians that they will learn the results of patient studies no later than 24 hours after tests are given.

The MR unit on the second floor of the Baker Building at the main campus will continue to serve patients, especially emergency patients, and children who may require anesthesia to keep them still during their noninvasive exam.

In helping physicians to diagnose illnesses or injuries, MR supplies pictures that show not only how the body looks but also how it is functioning.

This is made possible by placing the patient in a magnetic field and beaming a

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predetermined radio signal at the area of the body being studied. The signal excites atoms in the target area, causing them to emit signals of their own. From these, a computer can fashion images of the target and also furnish information about the chemistry of the tissue.

The MR scanner in use on Baker 2 at the MGH was installed in 1984. Capable of studying any part of the body, the device has been upgraded twice. The new machine in Charlestown, also a whole body instrument, has three times the field strength of the other and is truly state of the art. For certain problems it would be preferable. For other patients either system would be equally effective.

The MGH Imaging Center provides an effective response to ever increasing demands for diagnostic studies by magnetic resonance.

"We can make images in thinner 'slices' with the new machine so that in theory we would be able to detect smaller lesions," Dr. Brady said, "but in reality most patients come to us with lesions that are larger than a centimeter (about the width of a paper clip). The majority of the clinical work we do can be performed with either system and with the same diagnostic accuracy."

Dr. Jerry W. Froelich, Clinical Director of the Imaging Center, pointed to an important new capability offered by the recently installed Signa 1.5 Tesla instrument produced by General Electric:

"The Signa system allows us to look at the heart dynamically. From an anatomic point of view, it's easier to image the heart at a lower field strength. This is also accomplished very well with ultrasound. But getting dynamic information is more difficult without the newer system and the increased signal from the higher field strength magnet.

"I think the dynamic capability we've acquired will provide more information than we could possibly get from lower field, anatomic imaging."

Certain other situations, such as problems with a pituitary gland, call for images of very high resolution. If a physician feels that a patient's symptoms or laboratory findings warrant a high field MRI study, the patient can be referred to the unit situated on 13th Street in the Navy Yard, (617) 726-5700. The main campus MRI can be reached through (617) 726-7701.

The MRI Education Center, directed by Ms. Shelley Field, fulfills the hospital's responsibility as a teaching institution to instruct about magnetic resonance. The center serves both MGH physicians and those outside the hospital. They learn about the latest patient care applications of MR and can observe how the system is used on a day-to-day basis.

Dr. Brady said the principal goal of the center's research is to ensure MR imaging of the highest possible quality.

In one project, involving both Dr. Brady's group and Advanced NMR Systems, Inc., in Woburn, MA, a scanner has been developed that can image the heart in just one twenty fifth of a second. MR scanners now used for patients need several minutes for a comparable image. The ultra fast imaging overcomes loss of clarity caused by heartbeats and breathing.

The new device, called Instascan, is also said to have real potential in discriminating between liver cysts, common benign liver tumors, and cancerous cells that have spread (metastasized) from tumors elsewhere in the body. While conventional MRI is good at detecting abnormalities, it has difficulty characterizing their content.

In another research program, MGH radiologists using a standard MRI scanner have detected liver tumors as tiny as three millimeters (about an eighth of an inch) in patients who also received intravenous injections of a magnetic iron oxide contrast agent.

The best detection method until now — computed tomography enhanced with a contrast agent — is unable to detect tumors smaller than one centimeter. The new technique, still under investigation, thus has found much smaller liver cancers and many weeks earlier than possible with conventional means.

"We're also developing techniques to look at microscopic diffusion in tissue...how water moves through tissue... as a way to characterize pathology (disease)," Dr. Brady said.

"MR may not detect diffusion in a tumor; yet it may be different than diffusion outside of the tumor. This would be another way to provide image contrast.

"And we're looking at new techniques to do angiography with MR. Instead of injecting a dye to make blood vessels appear in images, the conventional method, we send in radio waves to get the same results noninvasively."

The area of research Dr. Brady considers most exciting involves magnetic resonance spectroscopy. With this technology, one can analyze biochemical reactions even as they occur in living cells and organisms and determine not only the presence of a problem but often also how best to deal with it.

Dr. Thrall, who has become the first Juan M. Taveras Professor of Radiology at Harvard Medical School, hailed his department's Charlestown unit as absolutely first rate:

"I believe it will stand as an example to our entire department and hopefully the entire hospital of the outstanding service that can be offered to patients and the medical profession."

A patient undergoes a magnetic resonance test.

A Word of Advice to Weekend Athletes: Moderation

WHILE SERVING in the Navy in the 1970s, an MGH orthopedic surgeon met an elderly man on a Pacific island who had never worn shoes but thought nothing of walking barefoot on knife-sharp rocks and coral.

"An ordinary person would certainly have sustained severe injury," said Dr. Bertram Zarins, Chief of the MGH Sports Medicine Unit, "but when I examined this man's feet, I found the bottoms covered with callouses that were almost an inch thick. The callouses, which had developed over a lifetime, were as hard as concrete. The man could walk safely on virtually anything."

Living beings can adapt to almost anything, given enough time, said Dr. Zarins, who also serves as Head Physician for both the New England Patriots of the National Football League and the Boston Bruins of the National Hockey League.

"As more and more stress is placed on a bone, the body adjusts for the increased burden by making the bone stronger," he said. "The same goes for repetitive stress on skin, muscles, ligaments, tendons, and many of the body's organ systems, including the heart. But adaptation takes time." As millions of Americans surge toward parks and playing fields with the return of warmer weather — a large percentage confining their activities to weekends — the need to advise moderation for most is clear.

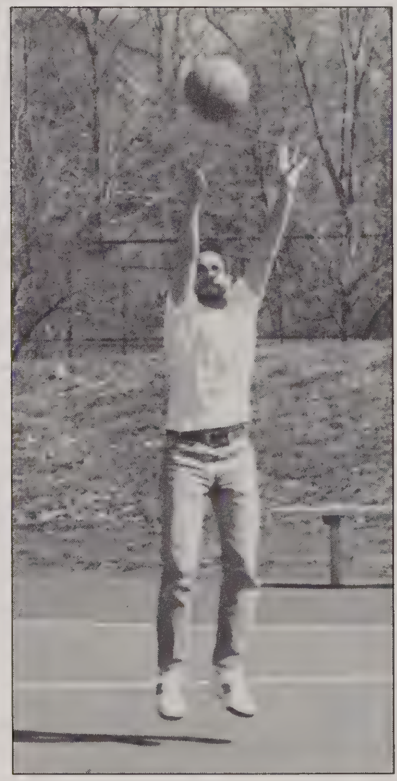
The individual who lives a sedentary existence five days a week and then, without preparedness, tries to become a weekend warrior is inviting injury.

A very large percentage of sports injuries fall into a "breakdown" or "overuse" category, a consequence of employing poor techniques or simply trying to do too much too soon.

"Exercises to develop flexibility, quickness, and strength are important preparations for weekend athletic activity," said Dr. Arthur L. Boland, Jr., another MGH orthopedic surgeon.

Dr. Boland is also Chief of Orthopaedic Surgery for the Harvard University Health Service and Head Physician for Harvard's Athletics Department which oversees 37 sports teams.

"We see a lot of injuries in recreational tennis," Dr. Boland said. "When a player who has done no exercising during the week suddenly goes all out on the weekend, there is a danger of straining the muscles on the outer side of the elbow, creating so-called tennis elbow."



Similarly in golf, the inner side of the elbow can become strained through overuse of tendons and muscles in curling the wrist to grip the club and to swing.

Dr. Boland said that proper exercises three times a week can usually prevent tennis elbow and golfer's elbow. Dr. Zarins recommended lifting the wrist while holding a one- or two-pound dumbbell. The exercising could be carried out while conversing on the telephone, watching television, or sitting in a car waiting for a traffic light to change.

In golf, one also has to be especially on guard to prevent back problems. The sport involves considerable torque through the spine. By going out and immediately slugging away, a golfer with a history of back pain faces a significant chance of reinjury.

Many people develop bad knees by overdoing high-impact aerobics. The music is turned on, and the participants in the exercises begin jumping. The result is often "jumper's knee," an inflammation of tendons around the kneecap.

Despite minimal physical activity all week many hardy souls attempt long-distance running on a Saturday or Sunday.

"It's would be wise," Dr. Boland said, "to approach that kind of a workout with an alternate walking-jogging-walking program. In this way, the participant would gain endurance and strength by slowly acclimating muscles to the stresses that are involved."

Most students who enroll at Harvard and try out for a sports team are in excellent physical condition because of regular exercising. But some students, especially those who engage in double preseason practice sessions, are not ready for work of such intensity. They commonly develop pain due to shin splints (a form of tendinitis behind the leg bone), or stress fractures and wind up missing part of the regular season.

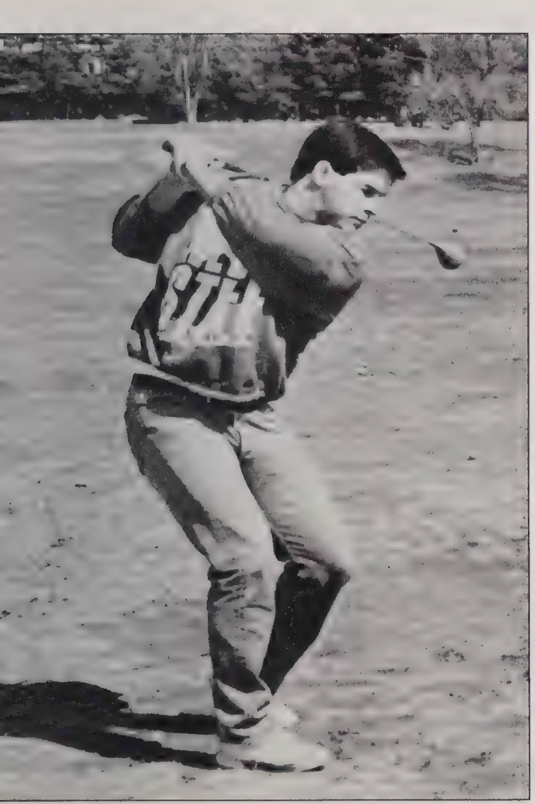
Similar injuries occur among students who elect to run longer events in college than they had trained for in high school.

Dr. Zarins said that professional football players who do not engage in a strenuous weight training and conditioning program are more likely to be injured than those who do. The majority of these injuries occur in the first three weeks of training.

"When a player is just getting into shape," he said, "the reflexes are not yet quick, and the body is not yet tough."

For intercollegiate or interscholastic games, Dr. Boland regards an athlete's speed and coordination as more important than size or body build.

"I would never rule anyone out on the basis of appearance or body shape," he emphasized. "A lot of people don't look like basketball players but prove to be quite good at the game. Similarly there are many football players who are not hefty but are quick, agile, and effective."



When an amateur athlete comes in for treatment of an overuse syndrome, Dr. Zarins makes a point of inquiring why the individual is participating in the activity that caused the injury. Sometimes the person is doing the wrong form of exercise to achieve a goal. The person may be lifting weights, for example, to get into shape when shoulder pain develops.

"Usually, the person doesn't really know what getting into shape means," the doctor said. "There's a specific adaptation for most activities.

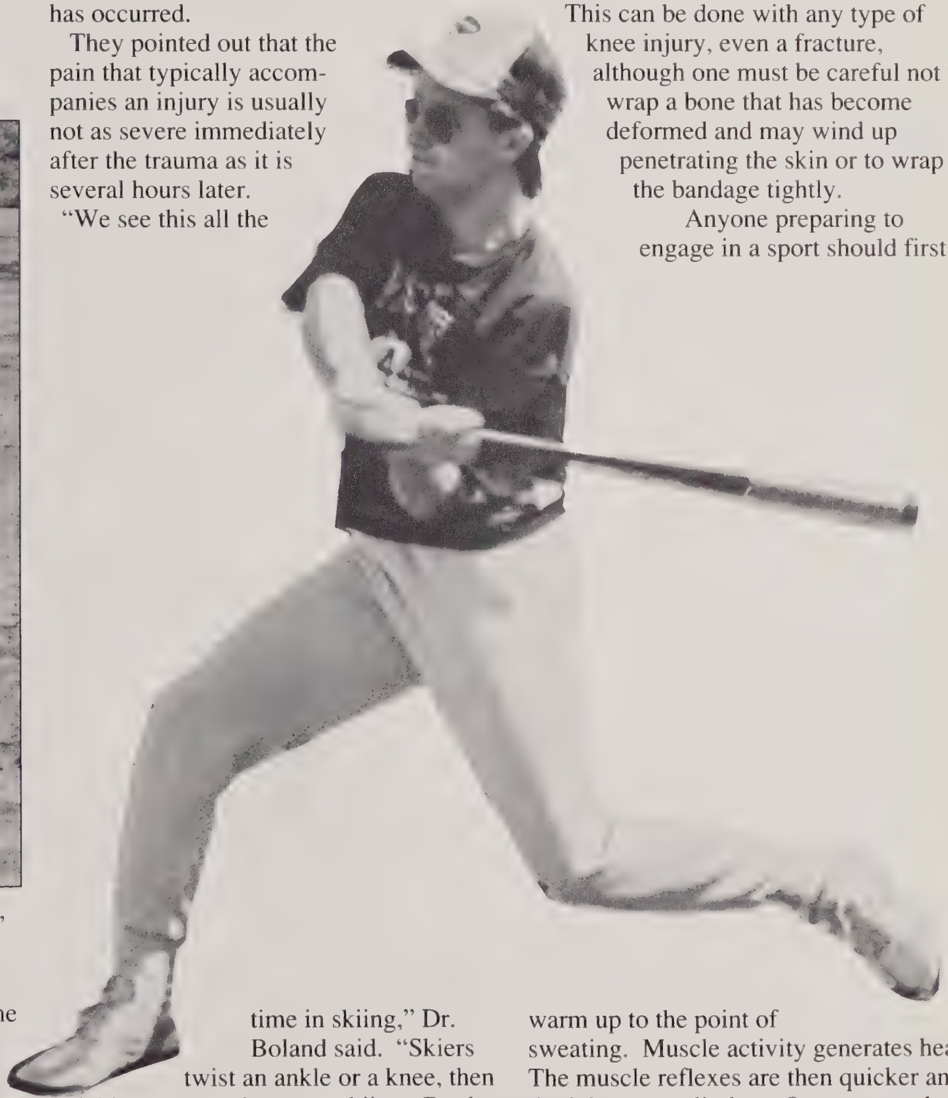
"Weightlifting will increase a person's strength for handling heavy loads. It will not help the tennis player who wants to improve the heart, lungs, and blood circulation, as well as develop greater muscle flexibility.

"The rate of injury from weightlifting is high among people who take up this activity late in life. The return is very small and when the weightlifting is discontinued the strength of the muscles regresses."

Both Drs. Zarins and Boland, who are Assistant Clinical Professors of Orthopaedic Surgery at Harvard Medical School, emphasized the importance of not underestimating the seriousness of an injury immediately after it has occurred.

They pointed out that the pain that typically accompanies an injury is usually not as severe immediately after the trauma as it is several hours later.

"We see this all the time in skiing," Dr. Boland said. "Skiers twist an ankle or a knee, then quickly get up and resume skiing. By the time they are halfway home, however, they've got a very painful, swollen ankle or knee. The harm is not irreparable, but the recovery period is prolonged."



Before undertaking his residency in orthopedics at Harvard, Dr. Zarins spent a year in Vail, Colo., tending injured skiers. He said that due to the temporary absence of pain following an injury, if a skier fractured a leg and was seen by the physician within five or ten minutes, the leg could be reset without anesthesia.

When a Patriots player comes off the football field with a knee injury, Dr. Zarins reaches him within seconds and can move the knee in any direction for examination without causing pain. The player, in fact, may want to return to the game right away but is kept out if the knee shows any sign of looseness.

To stanch bleeding within the joint and to reduce swelling, a dampened elastic bandage is loosely wrapped around the knee for compression and ice is placed on top of the bandage.

This can be done with any type of knee injury, even a fracture, although one must be careful not to wrap a bone that has become deformed and may wind up penetrating the skin or to wrap the bandage tightly.

Anyone preparing to engage in a sport should first warm up to the point of sweating. Muscle activity generates heat. The muscle reflexes are then quicker and the joints more limber. Once warmed up, the athlete can start more strenuous activity. The tennis player, for example, can then begin to serve or hit hard balls.

Drs. Zarins and Boland said people should realize that there are definite injury risks in certain sports and if they are not willing to accept those risks, they should avoid those activities.

For most people, jogging is relatively safe. So too are cycling and swimming. And there is always brisk walking.

Cancer Center

(Continued from Page 1)

"Some of the investigators come for additional exposure and experience in their field, and then plan to return home," said Dr. Kurt J. Isselbacher, Director of the Cancer Center.

"The French equivalent of the American Cancer Society, for example, sends two scientists a year to our center for periods ranging up to two years. Wealso have university professors who have opted to spend their sabbatical working here."

Some of the researchers who came for a set period, Dr. Isselbacher stated, have stayed on because "they found this environment to be excellent, and we found them to be superb in what they do. They've become members of both the MGH staff and Harvard Medical School faculty."

Dr. Isselbacher said that some of the cancer center's best scientists who undertook added training elsewhere, such as at Harvard or Massachusetts Institute of Technology, have expressed great interest in returning to the center.

"Two such people who had excellent cancer training at both the basic and patient care levels are returning this year," he said.

"One has done important research on why some tumors become resistant to certain drugs. The answer to that may pave the way for more optimal therapy. With such a background, the specialist can not only continue research here but at the same time be clinically active."

With regard to patient care, Dr. Isselbacher said that even as the cancer center builds its research strength, the MGH is looking toward an expansion of its medical oncology program.

A "day hospital" for ambulatory cancer patients will be in one of the two new high-rise buildings that will reshape the main campus. The concept can be compared with that of the hospital's surgical day care unit, except that the surgical patient may go home after only three hours while the cancer patient may remain anywhere from five to eight hours.

The cancer patient stays, in effect, for the day because cancer medications must be given intravenously over a prolonged period to avoid or at least minimize side effects. Some of the drugs also require a lot of fluid intake by the recipient to guard against possible harm to the kidneys. By spending several hours in the hospital, patients can be properly monitored for any reactions to their medicines.

The new buildings, one of which is nearly finished, will permit the establishment of an 18-bed medical oncology unit.

Many departments in the hospital, such as Orthopaedics, Urology, Dermatology, Gastroenterology, Pulmonary, and Gynecology, treat patients for cancer, but Dr. Isselbacher said:

"There's general agreement that oncology beds should not be scattered around the hospital. You can give optimal care by involving those nurses who are most familiar with anti-cancer drugs and their application. When a patient has to return, the established familiarity with the same group of nurses can offer considerable comfort."

Dr. Isselbacher said the MGH is also committed to developing a bone marrow transplantation program. "Ten to fourteen beds will eventually be dedicated to that effort in one of the new buildings," he said.

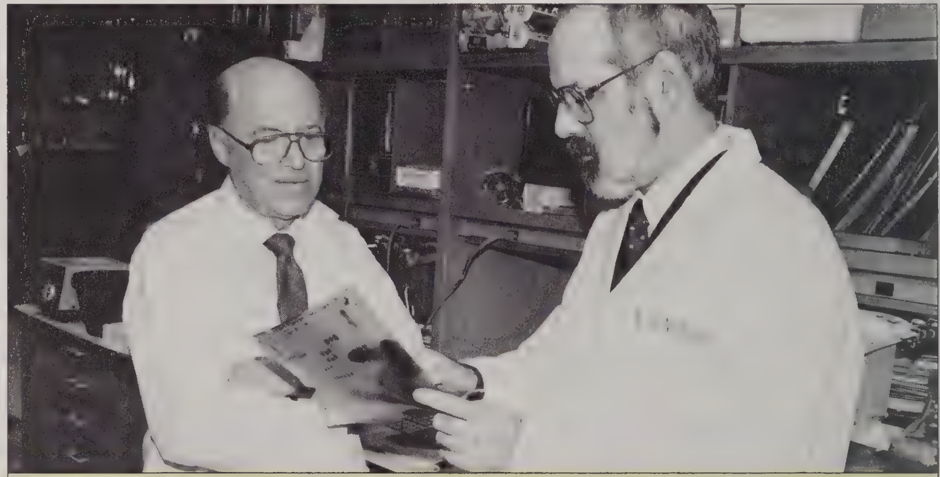
Marrow is the soft tissue in the center of some of the body's bones. Red cells which transport oxygen from the lungs through the bloodstream to all parts of the body originate in the marrow.

Patients considered for bone marrow transplants fall into two categories. One type has defective bone marrow that needs to be replaced by tissue from another person. In the second type of transplantation, the patient's own marrow is removed. As the individual receives radiation and drug therapy, unhealthy cells are separated from the removed marrow. Once the therapy is completed, the healthy cells are restored to the patient to rebuild the body's red cell population.

"This approach is also being investigated now in the treatment of solid tumors, such as in the breast, liver, or stomach," said Dr. Isselbacher, who is Mallinckrodt Professor of Medicine at Harvard Medical School..

"The bone marrow may be perfectly fine but you want to remove it before treating the patient and then give the marrow back. If you left the marrow during the treatment, the tissue's cells could be destroyed."

As the marrow is restored, growth factors are also infused to help boost the marrow's productivity of red cells, thus enhancing the body's protective immune system. It has only been within the last few years that researchers have managed to duplicate the genes for a number of growth factors so that they can be manufactured by molecular biology techniques.



▲ *Drs. Kurt Isselbacher, left, and James Michaelson discuss a gene experiment in the MGH Cancer Center.*

One of the most exciting areas of cancer research deals with genes in the body that act against cancer genes, known as oncogenes.

"I think we're learning, not surprisingly," Dr. Isselbacher said, "that we normally live with a tendency of cells to develop cancer balanced by other factors that hold those cells in check."

The concept developed with research on the disease retinoblastoma conducted at the Massachusetts Eye and Ear Infirmary, M.I.T.'s Whitehead Institute for Biomedical Research, and the MGH Cancer Center.

Retinoblastoma is a malignant tumor on the retina at the back of the eye. If the tumor is genetic, it tends to appear in infancy. But it can also develop spontaneously at any age.

Left untreated, the condition is fatal. At first, the affected eye had to be

Specialists Judge the Benefits of New Skin Remedies

THE MGH Dermatology Department has established a proving ground to test proposed new treatments for skin disorders.

After being on the drawing boards for more than a year and operating for several months in the Dermatology Clinic, the new Clinical Investigations Unit opened permanent offices on the fifth floor of the Warren Building.

The new unit provides expertise needed to conduct patient care trials and to meet detailed government requirements leading to the licensing of new drug products.

Pharmaceutical firms that conduct research and development programs have expressed enthusiasm for the new service.

Within the MGH, the unit will be invaluable in testing new treatments developed in the hospital's own laboratories. The unit, for example, will be able to interact with a similar test division in the Department of Medicine to determine whether new drugs developed there involve the skin and new medications in dermatology affect the entire body.

"I think the most exciting aspect of the unit," said its Director, Dr. Lynn Drake, Deputy Chairman of the Dermatology Department, "is the opportunity it affords us to gain hands-on experience with new drugs that may prove very helpful to our patients. Some patients have conditions that are currently very difficult to treat."

At present, trials are under way in the Clinical Investigations Unit on aging skin, acne, psoriasis, and fungal diseases. Studies of hair disorders and warts may begin soon.

Dr. Drake said the study on aging is aimed at learning whether skin wrinkled and made leathery by excessive sun exposure can benefit from very low doses of a drug already approved for use on acne.

As for acne itself, tests are being conducted with a new topical medication to see if it can relieve mild to moderate stages of the disorder.

A dressing now used in wound healing is being applied to psoriasis in the hope that it may shrink or eliminate psoriatic plaques. The dressing contains no medication. In another phase of the trial, however, a dressing that does contain a topical steroid cream is also being tested.

And for fungal diseases, which occur between a nail and skin or under a nail, Dr. Drake said the investigations unit is testing a medicated lacquer. "We paint it on just like nail polish," she said.

The formal opening of the new unit closely followed federal Food and Drug Administration approval of a drug evaluated by MGH dermatologists for the topical treatment of rosacea.

This is a chronic inflammatory facial disorder characterized by such skin features as redness (erythema), persistent or recurrent pimples (papules) and pus-filled swellings (pustules), and ugly red streaks from dilated blood vessels just under the skin's surface (telangiectasia).

"If you scan a large crowd, perhaps at an airport or train station, you will commonly see many people with what is probably rosacea," said Dr. Arthur J. Sober, MGH Associate Chief of Dermatology.

"Most dermatologists feel that half of the people with rosacea have never sought treatment despite their cosmetic appearance, including unpredictable episodes of flushing and blushing, often mistaken as an indication of excessive drinking."

So-called "flushers and blushers" tend as a group to have a vasculature that is particularly unstable. The blood vessels dilate much more readily than those of the average person to such stimuli as heat, wind, exercise, stress, and even reaction to medicines.

Rosacea most commonly affects people between 30 and 50 years of age with a greater frequency reported among women

(Concluded on Page 8)

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removed. Then radiation therapy came into use. Now, there are still other treatment approaches.

The research showed that the retina has a protective protein the lack of which permits the retinoblastoma to develop.

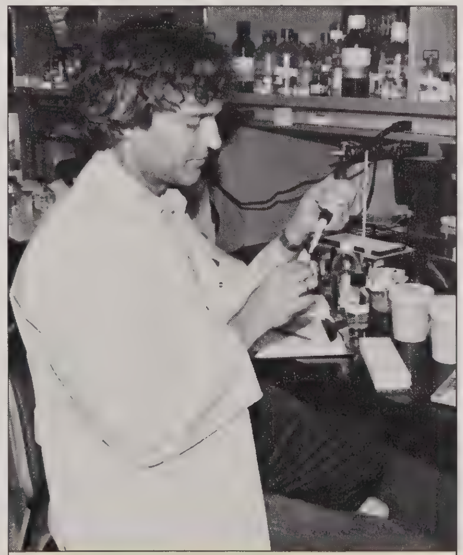
"Clearly, what we have to do now is put the gene for that protein back in to either prevent or reverse the situation," Dr. Isselbacher said. "We've also learned that this condition is not limited to retinoblastoma. This disease is providing a lesson of what probably is happening in a number of other types of tumor formations."

In another MGH Cancer Center study, certain proteins which help our immune system recognize foreign or diseased cells were shown to dramatically reduce tumor malignancies without any involvement of the immune system.

The study, by a team headed by Dr. Sebastiano Gattoni-Celli, involved the use of human colon cancer cells and a mouse gene containing the genetic coding to produce the protective proteins.

With the gene added, the cancer cells divided much less rapidly in culture than did cancer cells in another culture that lacked the gene. The results need to be reproduced in other laboratories.

The MGH Cancer Center has a number of key players involved in studies of genes in the body that help to suppress cancer genes. One investigator is Dr. Stephen Friend, an MD and Ph.D., who joined the MGH from the Whitehead Institute. His work is supported by a grant from the Markey Foundation.



▲ *Dr. René Bernards of Holland at work in the Cancer Center.*

Another specialist is René Bernards, Ph.D., of Holland, who came to the MGH a year ago. Several weeks ago, the pharmaceutical firm, G. D. Searle and Company, notified Dr. Bernards that he had been named a Searle Scholar, entitling him to a $60,000 a year research grant for three years. Only 15 people in this country are selected annually as Searle Scholars. Dr. Bernards was the only candidate chosen from Harvard.

Dr. Isselbacher, who headed the MGH's Gastrointestinal Unit for 30 years before taking the helm of the cancer center two years ago, said his staff has won considerable public and private grant support for their various research projects but financing remains a major limiting factor.

"There are more good people we could recruit, but we need the resources to optimize our efforts," he said. "We're still dependent on philanthropic contributions especially to support our younger talent to be sure they are not discouraged by the vicissitudes of federal funding."

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Dermatology

(Concluded from Page 7)

but with men suffering more severely.

Dr. Sober, who directed the MGH study on rosacea, said the increased frequency reported among women may simply reflect the fact that they are often more concerned about personal appearance than men and thus would be more likely to seek medical attention. Dr. Sober said he knew of no explanation for the greater severity of the condition among men.

In the MGH study, underwritten by Curatek Pharmaceuticals of Elk Grove Village, IL, 40 patients with moderate to severe rosacea (16 men and 24 women) were treated topically on one side of their face over a nine-week period with 0.75 percent metronidazole gel (MetroGel), an antibacterial agent.

Reporting on the study results in the *Archives of Dermatology*, Dr. Paul A. Bleicher, John H. Charles, and Dr. Sober wrote that the patients had a 65 percent reduction of inflammatory lesions. Facial redness was reduced from between moderate and severe to between mild and moderate. Improvement was clearly apparent by the third week and continued through the end of the trial.

The telangiectasia did not improve; in fact, a slight increase was noticed. Unlike facial blood vessels that constricted under treatment and lessened the redness they had projected, the dilated capillaries in telangiectasia were fixed, having lost their elasticity.

"Instead of the telangiectasia worsening," Dr. Sober said, "it's quite possible that the background redness obscured the presence of the fixed vessels and that once the skin improved, these vessels simply became more visible."

A tunable dye laser developed in the MGH's Wellman Research Laboratories and manufactured by Candela Laser Corporation of Wayland, MA, has demonstrated that it can provide an effective treatment for telangiectasia (*MGH News*, May 1986).

The design of the rosacea study was particularly interesting. Each patient received two tubes of gel for application to the face twice daily. One tube contained the metronidazole gel, the other the same gel without the drug.

One tube was labeled "right" for the right side of the face, the other "left." Each patient was invited to join an investigator later in judging the results of the trial, but no one, including the investigator, knew which side of the face had actually received the medication.

To further reduce the possibility of any bias that might be introduced by the patient's desire to see an improvement and the doctor's wish for an effective remedy, an investigator counted the inflammatory lesions on each side of the patient's face at three, six, and nine weeks.

In selecting the side of the face that looked better, the patient and the researcher in nearly all instances chose the side that received the drug.

Some rosacea patients have difficulty applying a medication to their face because their skin irritates so easily, but the topical gel was reasonably well accepted by the study participants.

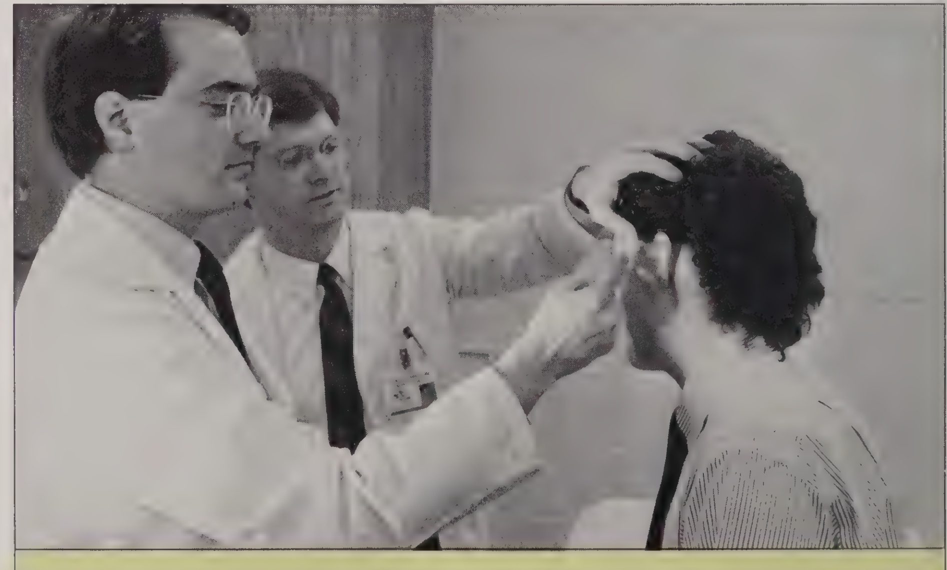
In the past, most patients with the affliction responded best to oral antibiotics. Tetracycline was far and away the most commonly prescribed drug.

Dr. Sober, who is also Associate Professor of Dermatology at Harvard Medical School, said, however, that although tetracycline remains a standard treatment for rosacea some patients cannot tolerate that medication.

"The drug can cause gastrointestinal difficulties," he said. "Many women develop a yeast infection. Women on birth control pills may find that tetracycline is making those pills less effective. And in some people, tetracycline is a photosensitizer, making the skin very sensitive to sunlight or ultraviolet radiation."

Dr. Sober said there are appealing reasons to treat topically when possible. The broadest appeal is that when only a small area, such as the skin on the face, is exposed to a drug, one can usually reduce the frequency of side effects throughout the body that might have resulted if treatment had been given internally.

In general, the doctor said, topical therapies are safer than internal ones.



▲ *Drs. Thomas Cropley, left, and David O'Connell examine a patient in the Dermatology Department's Clinical Investigations Unit.*

MGH News

Massachusetts General Hospital, Boston, Massachusetts

Vol. 49 No. 5 June-August 1989

New Treatment Studied for Head and Neck Cancer

A HORMONE WHICH MGH investigators have shown to be effective against skin and kidney cancers is now being directed at another cancer but in a different way.

A study has been launched in the MGH Cancer Center to determine whether interleukin-2 (IL-2) can make inroads against head and neck cancer when used with the protein alpha interferon.

IL-2 is produced in tiny amounts by the body's immune system and stimulates the proliferation of disease-fighting white cells called lymphocytes. Alpha interferon is produced by the body to counter viral infections.

The Director of the MGH project, Dr. Richard L. Kradin of the Immunopathology and Pulmonary Units, said the hope is that by combining IL-2 and alpha interferon "we may be able to produce a more powerful and effective lymphocyte to fight cancer."

The new study follows MGH Cancer Center trials in which IL-2 was combined in a laboratory with lymphocytes taken from tumors in seven patients with kidney (renal cell) carcinoma and the skin of 13 patients with malignant melanoma. In one month the lymphocytes were multiplied a million fold and then were infused into the patients with additional IL-2. The disease decreased in many of the patients.

In the program, which was codirected by Dr. James T. Kurnick of the MGH Immunopathology Unit and Dr. Kradin, the technique also was tried on eight

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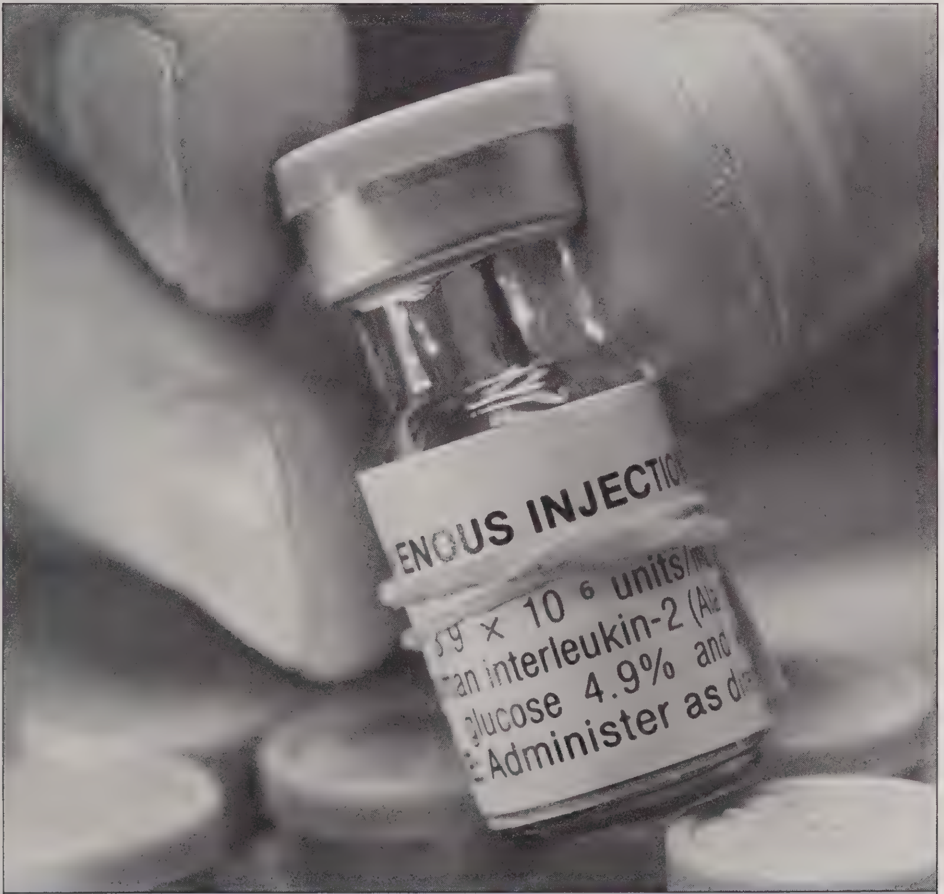

▲ *Each tiny bottle of interleukin-2 contains a patient's one-day supply of the anticancer drug.*

Looking for the Root of Language Deficits

A VERY COMMON effect of brain damage from a stroke or head injury is an impairment of language comprehension.

Patients with such problems often find that they have lost the most basic reading and writing skills and that their understanding of oral language has also become disrupted.

Although many people with such language disorders who have not had brain trauma have long been treated successfully, few brain-damaged patients have benefitted from the techniques.

One reason is that no tests have been developed which can pinpoint the precise problem, not the site of an actual injury to the brain but where an impasse lies in the language comprehension process.

(Continued on Page 6)

INSIDE

Page 4 — Varying sports leads to safer exercise

Page 7 — On kids who have too much

EDITORIAL:

An American Virus

THE TERM "AFFLUENZA" is appropriate. As the page 7 article explains, "affluenza" was coined to represent the excess of material things as well as psychological burdens we lay on our children. The disease is pandemic; for certainly we lavish all manner of presents as well as nonmaterial things on our progeny. Even the lower socioeconomic groups are guilty. Affluenza has spread with the celerity of a highly infectious virus. Like most viruses affluenza is resistant to agents that eliminate bacteria.

The virus spreads with devastating speed because much of the nation has so prospered economically over the last half century. If the child next door has an all terrain bicycle, then our Johnny needs one too. If Billy's classmate is a budding concert pianist, then by all means Billy should become no less himself. Perhaps the image of too much is no better illustrated than by the child sitting on the floor crying because of an inability to decide which of a dozen new toys to play with.

The glut of good things seems to do little good for the child. It is difficult to appreciate what we do not earn or deserve — especially when whatever it is pours down like water in a waterfall. Gifts are never a substitute for parental affection and guidance. The child whose poor parents share time and love with their young is much richer than the one whose cornucopia supplants love and presence. Kids need presence, not presents.

So many immigrants arrive in America with only hope. They work hard to save for their growing family's college education and somehow manage to provide "quality time" for their children. These parents worship at the altar of education they never had. By enshrining this concept of higher learning, they infect their children with the holy grail of college. Far better than material things. Far more effective than stern commandments to achieve. But far less practiced, one senses, by third and fourth generation Americans. And fifth. And. . .

For Those Who Want to Exercise

THE EXERCISE FAD which swept America just a decade ago seems to have abated. Certainly there are fewer joggers now, and sports such as tennis and racquetball have far fewer adherents. Still there are many more exercise buffs than existed before the 1970s, even allowing for demographic changes.

For them and for those who are thinking of becoming more active, a page 4 article describes some of the necessary precautions. The article is not for those who follow the maxim of a former president of the University of Chicago who said that whenever he felt the need to exercise, he lay down until it went away. Others will find the article useful.

New Cancer Study

(Continued from Page 1)

patients with non-small-cell lung cancer, but without success.

Head and neck cancers represent about five percent of all malignancies, ranking behind, but not far behind, lung, breast, and colorectal cancers.

Only about half of the head and neck patients are cured. Many do not come to the attention of physicians until the disease is advanced and has already spread.

Surgery and radiation therapy constitute the standard treatment. "Obviously, the affected areas are very sensitive," said Dr. Philip C. Amrein, an MGH cancer specialist who is also active in the study project. "We're describing areas where we talk, eat, and breathe. There can be major functional problems. And the surgery can leave cosmetic defects that may be impossible to hide.

"As for radiation treatments, they can cause permanent dry mouth or throat, alter taste, and sometimes make the skin or mucous membranes tough and leathery."

When a patient fails both surgery and radiation therapy, drug treatment (chemotherapy) follows. Only when a patient fails all three of these modalities will the interleukin-interferon approach be considered.

Dr. Amrein emphasized that the candidates must still be in reasonably good condition to assure a fair trial of the new treatment.

"We anticipate treating a dozen patients during the first year," he said. "If we see at least some favorable responses, we will treat more patients."

MGH*News*

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ILLUSTRATION: Page 6, courtesy of Dr. David Caplan.

The MGH Cancer Center trial is being supported by a grant from the pharmaceutical firm of Hoffmann-La Roche, Inc. Also under consideration are programs combining interleukin-2 and alpha interferon to treat patients with kidney cell cancer, malignant melanoma, and malignant tumors of the lymph nodes.

Head and neck cancers represent about five percent of all malignancies, ranking behind, but not far behind, lung, breast, and colorectal cancers.

While the new work is under way, the MGH investigation of IL-2 in combination with tumor-infiltrating lymphocytes (TILs), which began three years ago, will be on hold. A formal report on this work, funded by a $1.2 million grant from the National Cancer Institute, was published in the March 18th issue of the British scientific journal, *The Lancet.*

In the journal article, Drs. Kradin and Kurnick and nine other coauthors wrote that 29 per cent of the patients with kidney cancer and 23 percent of those with melanoma achieved objective tumor responses lasting from three to 14 months. No patients required intensive care monitoring.

The activated TILs required 100 times less IL-2 to support their cancer-fighting activities than did lymphocytes taken from the bloodstream (instead of from the tumor) in earlier IL-2 studies.

The latest trials demonstrated that toxic side effects from IL-2 correlated with the size of the dose given. Patients given only small amounts reported nasal stuffiness only.

All persons receiving higher doses experienced more severe side effects. The most common included fever (above 100.4°F), chills, skin rash, and inflammation of a vein with formation of a clot (thrombophlebitis) at the site where the IL-2 was given intravenously. More than half of the higher-dose patients had periods of nausea.

Dr. Kradin emphasized in an interview with the MGH News that although the tumor appreciably shrank in many of the patients, the results were graded purely on the response of the tumors rather on the patient's survival, which remains to be evaluated.

Commenting on the results of treatment for non-small-cell lung cancer, Dr. Kradin said:

"Certain types of cancers are susceptible to immunological manipulation whereas other cancers are not. Specifically, malignant melanoma and kidney cancer appear to be particularly susceptible to this approach while patients with lung cancer showed little response.

"Earlier, we had some initially favorable changes in patients with adenocarcinoma of the lung. We had several patients whose disease appeared to stop developing or decreased somewhat in size. When we critically reviewed all of the treatment data, however, we were unable to make a very positive statement concerning the response of patients with lung cancer to TILs and IL-2."

In expanding the original research, Drs. Kradin and Kurnick turned to cancers they thought were more likely to show positive responses.

In the Lancet article, the authors said the mechanism by which TILs and IL-2 reduce tumor levels remains uncertain. A distribution of radio-labeled TILs showed that the majority of those cells did not specifically move to tumor sites once infused into the body.

"Our best guess," said Dr. Kradin, who is Assistant Professor of Pathology at Harvard Medical School, "is that instead of killing the tumors directly, the interleukin-2 and the cells we administered may have promoted the patient's own immunological response. This is an aspect of therapy that still needs looking into."

In their studies of IL-2 and the transfer of tumor-infiltrating lymphocytes, MGH researchers have been working roughly in parallel with a National Cancer Institute team headed by Dr. Steven A. Rosenberg. At times, the studies have raised more questions than answers.

The Lancet article pointed out, for example, that Dr. Rosenberg and his colleagues had reported experiences in treating advanced malignant melanoma with IL-2, TILs, and high doses of cyclophosphamide, a commonly used anticancer drug.

The MGH researchers wrote that "therapeutic responses similar to those reported by that group were achieved in our study without the administration of cyclophosphamide."

Dr. Kradin told the News:

"Not only did cyclophosphamide fail in our hands to improve the response rates, it seemed to decrease the number of responses that we had seen with IL-2 and TILs. I'm not certain what accounts for this discrepancy. Only further studies will provide the answer." ■

▲ *Drs. Philip Amrein, left, and Richard Kradin confer in the MGH Immunopathology Laboratory.*

Varying Sports Leads To Safer Exercise

MANY PEOPLE who follow a sedentary life-style during the work week have an understandable temptation to unleash pent-up energy on the weekend.

"A 25-year-old in reasonably good health can probably go out and engage in almost any type of vigorous exercise without getting into trouble," said Dr. James J. Dineen, an MGH specialist in internal medicine, "but someone twice that age would be wise to plan ahead."

Dr. Dineen, who is also internist for the New England Patriots professional football team, firmly believes that a person in middle age who wants to keep fit should not be a devotee of only one sport but should embrace a variety of exercising activities.

"Sticking to one sport leads to repeated stress upon particular parts of the body," he said. "This becomes harder to tolerate in advancing years.

"Running or jogging pounds the joints and taxes the heart. Until the stressed areas calm down, one can turn to swimming to keep in shape. Similarly, when tennis causes an elbow or shoulder to ache, biking can be a good substitute during the recovery period."

The types of injuries possible in athletics, particularly contact sports requiring a lot of energy, are limitless, but overwhelmingly the degree of risk to the heart concerns physicians the most.

"Anyone who is over 50 and overweight should be careful about starting a vigorous exercise program," said Dr. Adolph M. Hutter, Jr., an MGH cardiologist and Chairman of the hospital's Medical Intensive Care Coordinating Committee.

"Such a person should be examined to determine the condition of the heart and whether risk factors such as hypertension, high cholesterol, or diabetes are present. The examining physician may recommend a stress test on a treadmill, using an electrocardiogram."

Most people, even those with a heart problem, can do some type of exercise. "For most with risk factors, it's really a matter of deciding how much one can safely do and making sure there is appropriate supervision," said Dr. Hutter, who is also cardiologist for the New England Patriots.

A weak heart muscle, however, can preclude exercise, and workouts involving heavy straining, such as in weightlifting, would be very bad for someone who, for example, has a weakening of the body's main artery, the aorta; a leaking aortic valve, or an abnormal thickness of the heart muscle beneath the aortic valve.

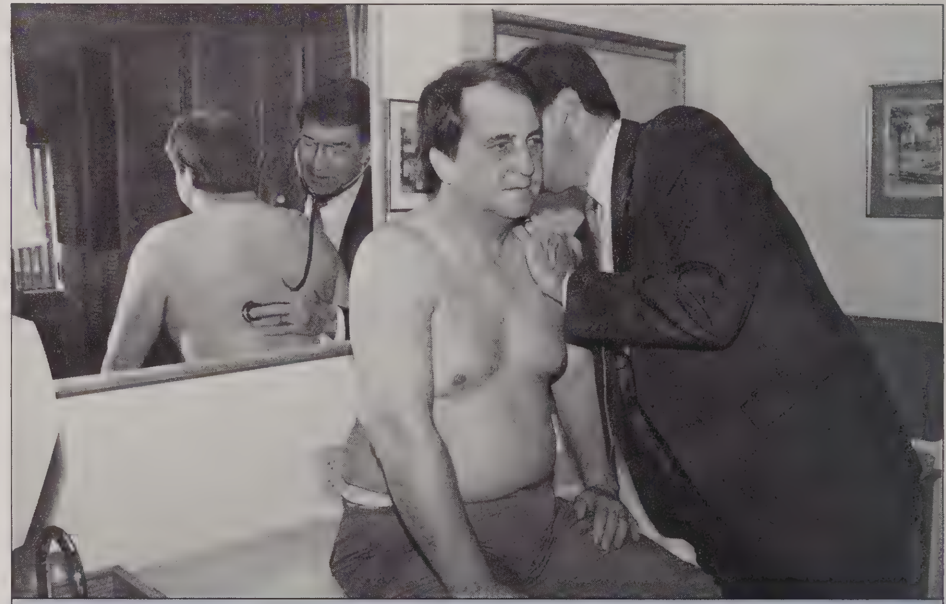
In examining young athletes, doctors look in particular for the abnormal heart muscle thickness whose cause is unknown. Its presence would automatically bar the affected individual from contact sports. In checking out candidates for basketball, physicians pay special attention to the tissue forming the aorta. Tall, gangly athletes (not uncommon in basketball) are more likely than others to have weaknesses in the main artery, a condition called Marfan syndrome. Athletes with this disorder are barred from basketball because under heavy stress the weak tissue is liable to tear.

For the vast majority of people, exercising can help to decrease the risk of developing coronary artery disease. Studies that have compared sedentary people with physically active ones have shown that the active individuals suffered fewer heart attacks.

For the general middle-aged or older person to keep trim, Dr. Hutter recommends a brisk walking program: three miles at 15 minutes per mile three or four times a week. That would raise the heart rate to 100 or 105 beats per minute, helping to improve circulation and muscle tone. The activity could be expanded to include some tennis, swimming, or light jogging.

Dr. Dineen also underlines the importance of tuneups. He says that just 20 minutes of exercise daily can help to keep one in shape.

On one day the program could involve toning up muscles with stretching, situps, and use of light weights. The next day, attention could be given to the cardiovascular system, e.g., brisk walking, use of an exercycle, or skipping rope. A few minutes should be reserved for warming up before exercising and for cooling down afterward.



▲ *Dr. Adolph Hutter of the Cardiac Unit examines a patient, John Rourke, to determine his suitability for an exercise program.*

Dr. Dineen also cautions his middle aged and older patients to avoid competitive contests in which other participants are younger or clearly more fit.

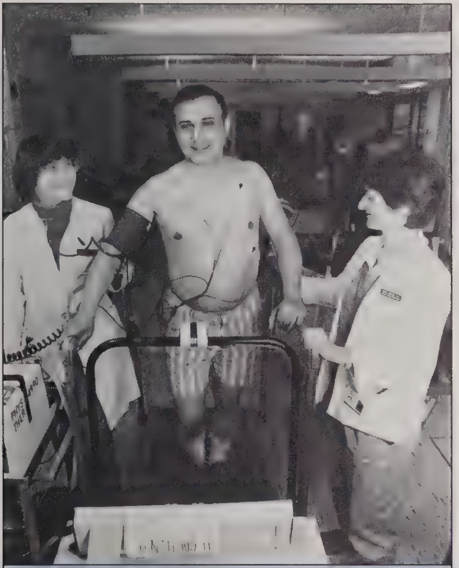
He admits to overlooking this rule a year ago and suffering from his mistake:

"I was watching some fellows playing basketball. One player had to pull out, and I was invited to replace him. Thinking back to my playing days as a youth and the fun I had competing, I accepted. I ran around the court without warming up and violated every principle that I know. Minutes later, I was sitting down with a ruptured Achilles tendon. Looking around, I realized everyone I had been playing with was at least half my age."

After the tendon was repaired, the doctor had a cast on his leg for six weeks.

Exercising should stop if dizziness, a fainting sensation, or breathlessness occurs. They could simply be signals that the body is out of shape, but if the symptoms are clearly inappropriate for the degree of activity, the exercise may be unmasking a problem.

The dizziness could indicate an inner ear imbalance or an interruption in the blood supply to the back of the brain. Near fainting might point to a blood pressure or cardiac difficulty.



▲ *John Caiazza, Ph.D., of the MGH Institute of Health Professions, undergoes an exercise stress test given by Theresa Michel, left, and Mary Devoe of Physical Therapy.*

"Breathlessness can be expected to some degree during exercise," Dr. Dineen said, "but it should subside as the activity slows. Inability to catch one's breath while at rest or during minimal exertion is a sign that something isn't right. The problem might be exercise-induced asthma. Anemia would also cause someone to fatigue easily."

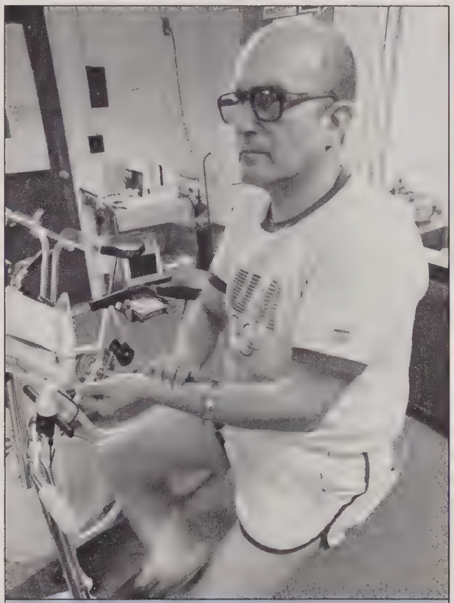
Although hypertension can become quite excessive during exercise, Dr. Hutter, who like Dr. Dineen has an appointment at Harvard Medical School, said that medication can usually control this. An exercise stress test while on the medication can show whether the drug is blunting the rise in blood pressure.

"There's nothing about cholesterol or diabetes which should interfere with anybody's ability to exercise," Dr. Hutter added, "but since they are risk factors for coronary artery disease it is best to screen the people involved to be sure that the blood flow to the heart has not been compromised."

The wise middle-aged weekend athlete makes certain before entering games like basketball, soccer, and hockey that there are rules to limit checking and that substitutes are sent in to replace players when they become tired.

The wise athlete also guards against psychological stress, which, if severe enough, could produce a heart attack or stroke.

Emotional stress raises the blood pressure and pulse while at the same time making the heart work harder by increasing the contractility of the organ. As coronary arteries shrink, blood flow to the heart decreases. Studies have shown that more people get into trouble from emotional stress than from physical exercise.



▲ *John Limongiello checks his pulse as he exercises on a stationary bicycle in the MGH-Harvard Cardiovascular Health Center.*

"Often, nervousness over a performance will increase a person's output of adrenalin even before the exercise workload begins," said Dr. Dineen. "With the heart rate and blood pressure already high, the athlete has less reserve to take on his planned activity.

"It doesn't make a lot of sense for weekend athletes to become involved in sports that are psychologically stressful. After all, the primary purpose of exercising is to do something that is pleasurable and relaxing." ■

▲ *MGH cardiovascular patients stay within a prescribed pace as they jog along Harvard University's indoor track.*

Order of Words Has Special Meaning For Aphasic Patients

(Continued from Page 1)

Even in the general population, efforts to diagnose reading disabilities, a part of the condition known as aphasia, have been conducted largely by trial and error, sometimes taking as long as three months. The task, just to determine where therapy should begin, not only demands enormous cooperation on the patient's part, it can also be frustrating for all concerned.

A patient's comprehension deficit may stem from an inability to remember the words being read. Or the patient may become easily distracted before reaching the end of a sentence and thus not understand the meaning of the sentence. Or a sentence may have a number of subordinate clauses, causing the reader to lose track of what is important and what is not.

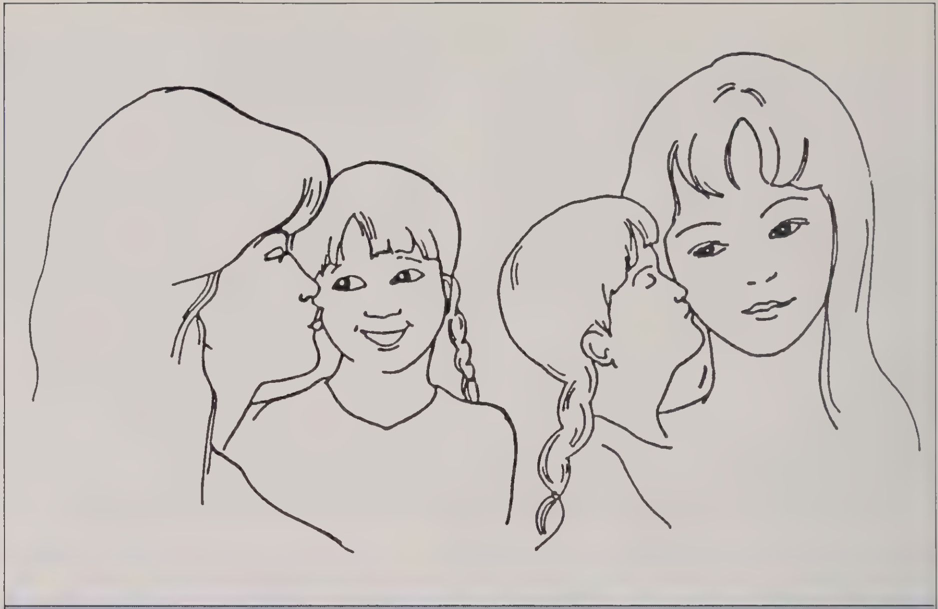
In the Neurolinguistics Laboratory of the MGH Institute of Health Professions, Nancy Hildebrandt, Ph.D., has embarked on a program to develop a battery of tests that will speed the identification of language comprehension deficits in brain-damaged patients and thereby facilitate rehabilitation efforts.

The five-year project, supported by a $350,000 grant from the National Institutes of Health, is designed to initially study disorders of written sentence comprehension.

"Some people can read words quite well but can't put them together to make a sentence," Dr. Hildebrandt said. "The meaning of a sentence is not just the meaning of the individual words that make up the sentence. The words also have a relational, or syntactic, meaning."

In the simple sentence, "John hit Mary," for example, one knows that John committed the action and Mary was the recipient. In another sentence, "John was hit by Mary," it is clear to the linguistically normal individual that this time Mary struck John.

The tendency of aphasic patients when they do not understand a sentence is to interpret words in the order in which they come. To these patients, the first noun automatically represents the person doing the action and the second noun identifies the receiver. Using this interpretation, the sentences, "John hit Mary" and "John was hit by Mary" would mean exactly the same.



▲ *Sentences such as "The woman kissed the child" and "The woman was kissed by the child" mean the same to many aphasic patients. To them, the first noun indicates the person committing the action and the second noun the receiver.*

Dr. Hildebrandt said it is very common for aphasic patients to miss the little words in a sentence.

Recalling her doctoral studies which dealt with the same problems she is concentrating on now, Dr. Hildebrandt said that of 10 patients she tested for her thesis at McGill University in Montreal, eight had the kinds of impairment she was looking for.

"They all had small breakdowns in syntax, the way that they formed phrases and sentences," she said. "The breakdowns were different, but when we compared patients with each other, these small impairments told us things that were important in linguistic theory and language processing."

Before studying for her doctorate in linguistics, Dr. Hildebrandt spent eight years in Japan teaching English as a second language to university students. Her work today on language comprehension disorders sometimes reminds her of former students.

"The patients I work with are adults cognitively," she said. "They know what they want to say. They know the words. They know the concepts. They just can't put it all together. It's like students hearing something in a foreign language. If they don't understand the syntactic structure of a sentence, they'll have trouble. Sometimes they can pick out a word here and a word there and put them together in a way that makes some sense, but many times they can't."

In her newly funded project, Dr. Hildebrandt expects to test about 20 brain-damaged patients a year, most of them stroke victims. She will see each once or twice a week over a three to four month period. To enroll in the program, each individual must have a good ability to understand single words.

Dr. Hildebrandt facilitates a patient's test responses by having the individual hold a pair of small stuffed animals, perhaps a tiger in the right hand and a bear in the left. By manipulating these animals, having one hit the other, the patient would mimic the action as he sees it in such sentences as "The tiger attacked the bear" or "The tiger was attacked by the bear."

"We use a lot of different sentence structures in the test, trying to learn which ones the patient can interpret well and which ones he has trouble with," Dr. Hildebrandt said. "We can then hopefully come up with an hypothesis of what the problem is."

At this point, Dr. Hildebrandt usually constructs additional test sentences, the responses to which are now predictable.

"If it appears that a patient is really missing a particular structure for a particular reason, we should be able to judge the level of complications at which the breakdown will occur," she said.

From object manipulation, Dr. Hildebrandt will move on to other kinds of tests, some involving computers, to more accurately pinpoint and analyze language comprehension difficulties.

"The more one can demonstrate a specific deficit occurring with different tasks, the stronger the findings become," said the MGH linguist, who is also affiliated with Harvard Medical School and Massachusetts Institute of Technology.

Once the deficit is firmly identified, the information will be relayed to a therapist in the MGH's Speech-Language Pathology Unit to permit the development of very specific rehabilitation strategies.

Mrs. Helaine Schupack, a reading therapist in the unit, said that Dr. Hildebrandt's program is especially timely because therapists are now taking on increasing numbers of head-injured patients, particularly young people.

"Those of us who treat reading disabilities in the population," she said, "are beginning to realize that some of the techniques we use with the learning disabled work as well for some of the brain-damaged patients."

She told of a young man who suffered a hemorrhage and lost all ability to read or write. He still understood words, but he could not recognize them. He could not even read the alphabet.

Mrs. Schupack painstakingly taught her patient the alphabet and how to decode, or sound out, words. Today, seven years after his hemorrhage, the patient, who is 27 and lives alone, can sound anything out, albeit very slowly.

"When mail comes to his house, he no longer has to take it next door and ask a neighbor to read it for him," Mrs. Schupack said. "He can pick up a newspaper and read it, not with fluency but in a very functional way."

Mrs. Schupack expects that the kinds of tests being developed by Dr. Hildebrandt will not only help people who have suffered strokes or head injuries but will also benefit patients with dyslexia, an inability to read efficiently despite normal educational opportunities and normal intelligence. The disorder affects millions of Americans.

"We know that the reading score of dyslexic patients is low, especially their reading comprehension, but we usually don't know why," Mrs. Schupack said. "Good tests would make our diagnostic effort much more efficient and do away with the trial and error process that we have had to follow for so long." ■

A NOTED BOSTON surgeon once told his son as his graduation from high school drew near:

"Son, you can be anything you want to be in life. You have my blessing to set your own goals, pursue any career, accept any challenge..."

But the doctor quickly added, "...just as soon as you get out of medical school."

Who hasn't heard of a high-achieving father trying to cast an offspring in his own image. Or a less successful parent vowing, "My child will never have to struggle the way I did."

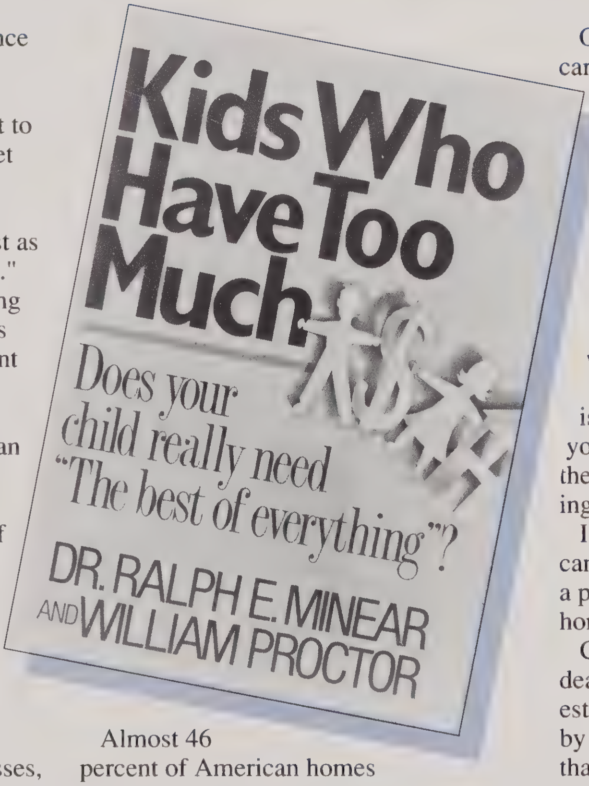
As both parents in so many American families devote much of their time to careers in the workplace or to other interests outside the home, millions of children are being caught up in a social epidemic.

The symptoms boil down to the children receiving too much of something, e.g., freedom, money, food, protection, parental sacrifice, and, often, pressure to achieve.

Although the malady affects all classes, it has been labeled collectively as "The Rich Kids Syndrome," or "Affluenza."

In a new book, *Kids Who Have Too Much*, published in April by Thomas Nelson, Inc., of Nashville, Dr. Ralph E. Minear of the MGH Children's Service and coauthor William Proctor wrote that many advantages children have today are not bad or undesirable:

"Rightly used, they can get a youngster off to a fast, effective start in realizing his full potential in life. But sometimes, it's possible to get too much of a good thing, to get good things in the wrong way, or to receive 'advantages' with the wrong messages attached."



Kids Who Have Too Much

Does your child really need "The best of everything"?

DR. RALPH E. MINEAR AND WILLIAM PROCTOR

Almost 46 percent of American homes with one or more children have two working parents. Also, one quarter of America's children live with only one parent. As many as 10 million youngsters spend some time during the day alone and unsupervised at home.

Even though parents may shower a child with material goods, inadequate interaction can lead the youngster to feel lonely, bored, and fearful, to fall behind in schoolwork, adopt poor eating habits, and to feel unwanted.

More and more young children are spending a greater number of waking hours each day with baby sitters than with parents.

Often the surrogates are unqualified as caretakers. Frequently, they will turn on the TV to while away the time, and as they watch romantic episodes on soap operas, so do the children.

"Many of the scenarios that are acted out on television are simply inappropriate for the eyes and ears of a young child," said Dr. Minear in an interview at the MGH's Bunker Hill Health Center in Charlestown where he is Chief of the Pediatric Unit.

"One of the things I stress to parents is that 'your children learn by watching you. If TV substitutes for your presence, then the youngsters will learn by watching the actions of adults on the screen.'"

Instead of snapping on the TV, a sitter can take a child to a playground, arrange a picnic, or have other children into the home for all to play creative games.

Children may appear to have a great deal but actually suffer from low self-esteem because they may be looked upon by their parents more as a commodity than as a loved one.

Dr. Minear recalled the comments of a father who accompanied his seven-year-old daughter to the physician's office for her regular checkup.

The father said, "My wife and I have been thinking about having another kid, but do you realize what they cost these days? I've read that it costs over a quarter of a million dollars just to get the average child out of high school!"

Dr. Minear said that as the father spoke his daughter clearly was interpreting his remarks as meaning that money was a consideration in having her as well as in contemplating a new sibling.

(Concluded on Page 8)

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A New Children's Disorder: Affluenza

(Concluded from Page 7)

The older the child the more he or she is deemed capable of shouldering responsibility. Thus, the youngster is accorded more freedom. But what may be true of one child may not be true of another of the same age.

"Some children at eight or nine shouldn't be left alone because they're naturally fearful and the solitude will only aggravate that," said Dr. Minear. "But *most* children at this age can be left alone in the house for 15 minutes or a half hour provided they know where their parents have gone, how to reach them, and when they will return. Being left alone for even a short time can give children a sense of greater maturity."

In *Kids Who Have Too Much*, the authors cite key danger signals that a child has too much freedom and not enough parental attention.

As one might expect, evidence that a child smokes, drinks alcohol, or uses drugs is a leading danger sign. Many times parents shrug off such behavior. "He's only going through a phase," they may say. Most children, however, are too immature for such decision-making and fail to recognize the emotional as well as physical harm that can result.

Secrecy by children whose relationships with their parents are not on the best footing can point to a serious problem.

Dr. Minear told of a 14-year-old girl who kept retreating to her room and locking the door. At first, her parents felt, "Well, she just needs her privacy." One day, however, they entered her room when she was absent and came upon a cache of cocaine and a supply of pills.

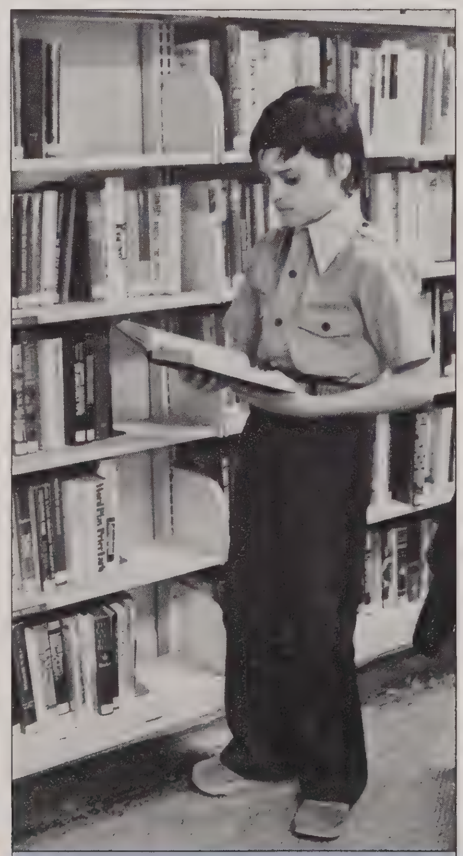
It turned out that because of poor communications with her parents, the teenager felt a need to rebel. Using drugs was the route she chose.

Parents who have a hands-off attitude toward a youngster's homework, claiming that it is the child's responsibility, may be looking for trouble.

As much as teachers strive to do their best, they cannot always give as much attention as they would like to one student. Thus, when a youngster working on his homework tells his parents, "This is too hard for me" or "I don't feel like doing any more tonight," the parents must show an interest.

"Giving freedom to a child to study only when he feels like it isn't freedom at all," Dr. Minear said. "It's neglect."

One of the most difficult issues facing modern parents is how to handle a child's developing sexuality. To avoid discussions of such delicacy, parents frequently relinquish all authority over their children's emerging sex lives. Allowed to operate on their own, some youngsters wind up in major difficulty before they realize what is happening.



▲ *A child should not be pressured to one day match parental achievements.*

Being protected by access to too much money can give a child the feeling that he is somehow naturally entitled to money without having to work for it.

"It's difficult to feel good about yourself, to sense that you're really a competent, worthwhile person, if you have everything done for you," said Dr. Minear, who is an Instructor in Pediatrics at Harvard Medical School.

He described a young man who inherited a fortune on the death of a parent and never bothered to cultivate any career ambitions. Why work, he asked himself. When this attitude began to have an influence on his own young son and daughter, however, the man became concerned and sought help from Dr. Minear.

The doctor suggested putting the fortune into a trust which would allot the father a certain sum every six months. This limited how much the family could spend. After accepting the advice, the father soon began to think of what kind of a job he could pursue, and the children began to pay more heed to their studies.

About kids who come under too much pressure to perform, the great danger is the stress it produces. Studies have shown that children with stress-related problems develop an unusual number of illnesses and tend to recover more slowly than others under less pressure.

Dr. Minear also cautioned parents that "you can't expect a child to become exactly what you want him or her to be!" Children under such pressure, he said, typically revolt or underachieve. Even if the child acquiesces and enters a field a parent has chosen, the child will often change careers later and pursue an occupation more personally desirable.

Kids Who Have Too Much offers parents an opportunity to judge whether the Rich Kids Syndrome threatens their family. The book contains an 89-question true-or-false test covering pertinent activities, habits, and relationships that a family may experience. The score parents get indicates whether their children are a low, medium, or high risk for the syndrome.

MGH News

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Mounting Successes Spur Heart Transplant Activity

JOHN NICOLOSI of Everett, MA, was born 35 years ago with five strikes against him.

They were deformities of the heart.

Until he underwent surgery at the age of 7, John could not walk anywhere without stopping every few feet to catch his breath. The operation, followed by another at the age of 19, enabled the young man to function fairly well provided he rested as soon as he felt tired.

But five years ago, John's heart began a slow but steady deterioration. "My system started to retain a lot of fluid, and I became winded very quickly," he said.

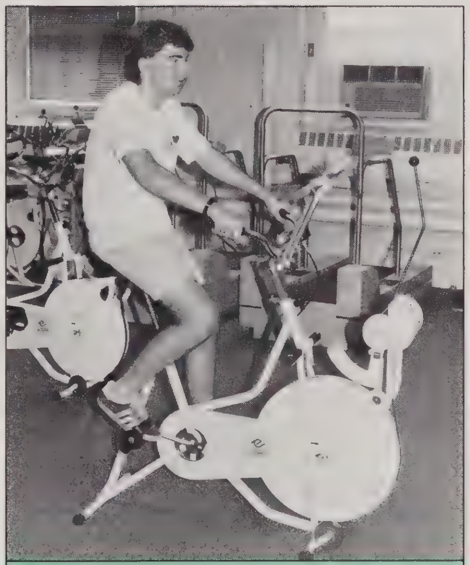
By late 1986, it became clear that only a new heart could save his life. After five months, the heart of a 35-year-old automobile accident victim became available.

Today, two and a half years after his transplantation at the MGH, John joins his peers in many activities never before open to him.

The 5-foot 9-inch, 150-pound bachelor skis, plays basketball, lifts weights, pedals a stationary bicycle for a half hour three times a week, and at Boston University where he works as a credit analyst, he pitches on a softball team.

John Nicolosi is finally in the mainstream of life.

Similarly, after years of trial, heart transplants have at last been recognized as lifesaving and have taken their place in the mainstream of medicine, covered by most of the nation's health care insurers.



Operated on last year at the age of 15, Chris Darcy of Dorchester, MA, is the MGH's youngest heart transplant patient.

Between 1980, when the potent drug cyclosporine was introduced to help prevent the body's rejection of donated organs, and the end of last year, the number of hearts transplanted annually in this country rose from 36 to 1,647.

Of 19 MGH patients who have undergone this operation, 13 survive. Three deaths occurred during the first year of the hospital's program, which began in November of 1985.

During the past 2-1/2 years, 12 of 15 heart transplantations at the MGH were successful. The 80 percent success rate is comparable to the best programs in the nation.

One special feature of the program is the fact that in transplanting hearts the MGH and three other Boston medical institutions — Brigham and Women's Hospital, New England Medical Center, and Children's Hospital — work together to optimize patient care. This arrangement has been successful as not only the MGH but all four centers enjoy impressive records.

In 1985, to serve all New England, the four hospitals formed a consortium called The Boston Center for Heart Transplantation.

The consortium reviews all patients listed with member hospitals who need a heart transplant. Priority of need and blood matching decide who gets a donated organ processed through the New England Organ Bank.

Approved from the outset on an interim basis by the state, the Center last month formally received permanent backing by a vote of the Massachusetts Public Health Council.

The four hospitals follow the same protocols in giving organ-protecting immunosuppressive drugs and observe mutual guidelines for diagnosing rejection.

When a 5-year-old MGH heart patient needed a transplant, she was transferred to Children's Hospital because it had greater experience among the very young. Later, a long-time patient at Children's was transferred to the MGH for transplant surgery. Since he was now 20 years old, it was considered more appropriate that he be put in MGH hands.

When surgeons on a transplant team are away, colleagues at other institutions stand ready to fill in if the need arises.

(Continued on Page 4)

Asthma:

Easier To Treat But Still Deadly

TOTALLY TREATABLE....

That's how many doctors describe asthma today.

So why are more Americans dying of asthma than ever before?

The disease, whose name came from the ancient Greek word meaning to breathe hard, affects eight million Americans.

In the past decade, powerful new drugs have been introduced to combat in the respiratory tract the muscle spasms, membrane swellings, and accumulations of mucus which bring on the gasping, wheezing, and coughing that characterize asthma.

(Continued on Page 2)

EDITORIAL:

Heart Transplantation

A QUARTER OF A CENTURY has passed since the MGH began what became successful heart transplantation research. There were several reasons why the hospital failed to translate that success into human heart transplantation. One was New England conservatism. The MGH carries out a wealth of pioneering research. The hospital tends, nevertheless, to shun major new patient care if the results elsewhere prove poor. That certainly was the case for many years after the first heart transplant attempt in South Africa. It was not until many years of persistence by Dr. Norman Shumway at Stanford University Medical Center that the one-year survival rate began to look meaningful.

There was a major second reason that was more important than conservatism. The MGH Board of Trustees felt there were by contrast other well proven procedures that could help many more people than could heart transplants. For each heart transplantation, there could be several times as many of those proven procedures that were less labor intensive. A number of other hospitals were verging on undertaking the procedure but instead followed the MGH lead. It was the advent of cyclosporine A, a drug that vastly improved the outlook for heart transplantation patients, that more than any other factor convinced the Board of Trustees to allow that surgery.

The tools were all here at the MGH. Some of these tools developed here had helped other heart transplant centers improve their own results. The federal government had repeatedly demonstrated its confidence in the MGH's research program with multi-million dollars of funding over a number of years. When the MGH decided to go ahead with heart transplantations, it was successfully carrying out bone, kidney, and liver transplants, and combined pancreas and kidney.

During the past 2 1/2 years, 12 of 15 MGH heart transplants have succeeded. That is a success rate of 80 percent. A very good record but not surprising. In addition to about 25 years of research in heart transplantation and 26 years of kidney transplantation, the hospital carries out about 1,200 open heart operations a year. The MGH has very good results with various kinds of transplants and the numerous open heart procedures.

In addition, the heart transplantation is carried out as a cooperative venture by the MGH and the three other Boston teaching hospitals which perform heart transplantation. By working together the four institutions are able to share resources and thereby reduce the financial burden. With its unusual number of excellent teaching hospitals, Boston has a unique ability to cooperate without suffering a loss of quality. This is the sort of quality which has attracted the sick from all over the world.

Asthma Warns When A Crisis Draws Near

(Continued from Page 1)

Nevertheless, deaths from the disease have been climbing steadily. Between 1982 and 1986 alone, the mortality rate reached 1.5 per 100,000 population, an increase of 25 percent. Indigent people, largely Blacks and Hispanics, figured most prominently in the increase.

In New York City, where in May asthma took the life of the chancellor of the city's school system, Dr. Richard R. Green, the death rate from the affliction is three and a half times the national average.

Lack of access to medical services, noncompliance with prescribed therapy, and a false sense of well-being conveyed by some medications are a few reasons postulated for the rise in asthma deaths.

Dr. Charles A. Hales, Associate Chief of the MGH Pulmonary Unit, said that people do not die from asthma without warning.

"Studies have shown," he said, "that before asthmatics go into crisis, most suffer a slow worsening of their condition. They either don't seek help because they're unaware that they're becoming sicker, or they don't want to wait for care in a busy hospital emergency room."

Dr. Hales said that although physicians understand asthma better now than they did a decade ago, they still do not know what causes most asthmatics to have their attacks.

All asthmatics have hypersensitive air passages (bronchial tubes). They overreact to certain agents or conditions

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that do not bother other people. These agents include pollen, molds, fur, feathers, animal dander, dust, chemicals, tobacco smoke, certain foods, cold air, and emotional disturbances.

Asthma can easily go unrecognized because the response to an allergen may come hours after the patient has left the setting where exposure took place.

Take a visit to a Chinese restaurant. An allergic reaction to the food additive MSG (monosodium glutamate) or sulfites included in the food as a preservative may not occur until eight hours after eating. During the delayed reaction, the patient may have eaten another meal, adding to the confusion.

"People with asthma often fail to realize that they can avoid trouble by simply doing without certain things in life," said Dr. Hales. "A physician experienced in treating the illness knows what situations lead to a delayed response and can help patients to identify a potential problem."

Early identification and treatment are critical to avert possible inflammation in the respiratory tract. This can so constrict the bronchial tubes that the patient's breathing is cut off.

Aerosol sprays are available to dilate the bronchial passages when an asthma attack starts, but certain drugs are more appropriate than others, and sometimes medicines should be used in combination.

Asthmatics typically carry inhalers containing albuterol to relax the bronchial muscles. If one's asthma is moderately well-controlled, aminophylline taken daily can avert attacks and measurably improve breathing function. Cromolyn helps patients on a long-term basis. If a patient becomes short of breath and only then turns to this drug, it will not help much.

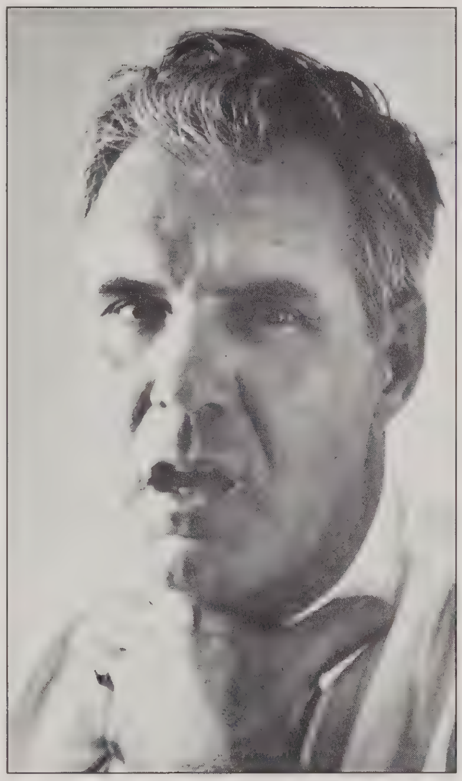
Dr. Hales said that bronchodilators containing epinephrine, or adrenalin, are available over the counter and work well for certain asthmatics but are not for everybody. In opening the airways, the epinephrine also makes the heart beat faster and perhaps irregularly. A young person without a heart condition can probably tolerate the reaction, but it is not clear that an older person can.

"The new inhalers have a much bigger safety margin than the over-the-counter medications," Dr. Hales said. "But even prescribed medicines have a potential for harm if the dose given is too high."

If asthma causes inflammation, bronchodilators will provide only limited relief. Physicians must turn to more powerful corticosteroid drugs.

Steroids can cause unwanted hair growth, rounding of the face, reduced resistance to infections, and osteoporosis resulting from a loss of calcium from bones, but Dr. Hales said:

"The principal steroid we use as an inhaling substance to treat asthma has a large molecule attached to it which confines it to the airways. That way, the drug acts much like a steroid cream on the skin, causing a more intense exposure where it is needed. With less of the drug entering the bloodstream, the systemic side effects are considerably reduced."



For years, people with asthma have been warned to avoid exercise or risk an attack of their illness. Today, exercise is regarded as beneficial for the asthmatic provided the proper activity is chosen. As a precaution, however, Dr. Hales advises using a bronchodilator a few minutes before a workout starts.

The MGH pulmonary specialist said there is little doubt that emotional distress can exacerbate asthma.

"About 40 percent of asthmatics are highly suggestible," said Dr. Hales, who is Associate Professor of Medicine at Harvard Medical School. "If such a person were allergic to ragweed and you gave the individual an aerosol that you said contained ragweed, the person would likely suffer an attack even though the aerosol really contained water."

Dr. James M. Perrin, who directs ambulatory care programs and the Division of General Pediatrics in the MGH Children's Service, has reported on a program to help asthmatic children who have psychological problems.

The project was conducted while Dr. Perrin was on the faculty of Vanderbilt University in Nashville. He was principal author of the findings published in the *American Journal of Diseases of Children.*

"We knew from working with families that if the parents of a child having an asthma attack became really anxious and didn't quite know how to calm the youngster, the child tended to become sicker faster," Dr. Perrin said.

Significant negative events in family life, such as a parent losing a job, also had a psychological impact on offspring, leading to more serious asthma conditions.

Dr. Perrin and several colleagues organized a stress management program for asthmatic children aged 6 to l4. With their parents observing, the children met with the doctors on four Saturdays.

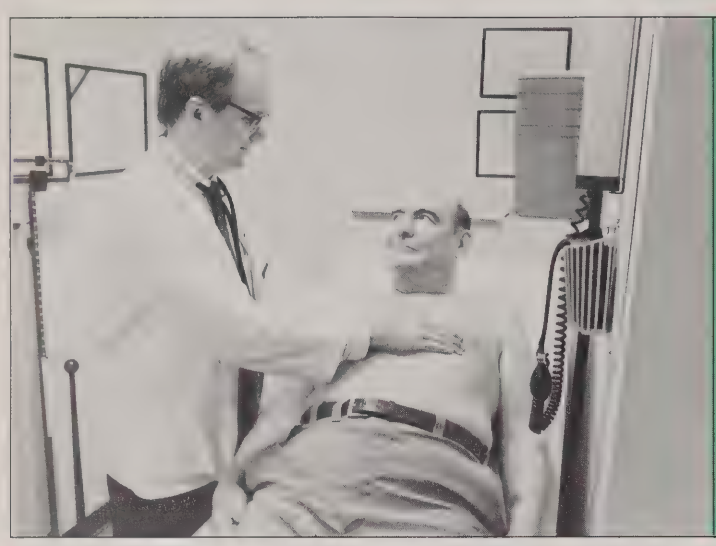
"We began by discussing asthma in an age-appropriate way," said Dr. Perrin, "explaining what the illness is like, how it might flare, and how medicines to prevent or counter an attack work. Later in the morning, a psychologist taught relaxation techniques, including measures specifically related to the control of breathing."

After the course, which 30 youngsters completed, the doctors found that the intervention group had become noticeably healthier than had 23 asthmatic children in a control group (who later underwent the same program with beneficial results).

Dr. Perrin described asthma as the most common chronic illness in children. He estimated that three to five percent of youngsters have the condition, but the average young patient needs medication only during the height of the season when whatever he is allergic to is most rampant.

Dr. Hales said much effort is being made to discover the mechanisms responsible for asthma. He pointed to a recent article in the *New England Journal of Medicine* which described lack of a substance called a vasoactive intestinal peptide in the airways of asthmatics. The peptide acts as a dilator, suggesting that most people have a natural dilator in the lungs but that in at least some asthmatics it is not present in as great a concentration.

"I believe that research into asthma is making substantial progress," Dr. Hales said. "The more we understand about asthma, such as why some people get it and others don't, the better we'll be able to manage the illness." ■



Dr. G. William Dec examines Donald Cox 19 days after the 59-year-old Rockland, ME, man received a new heart at the MGH.

Greatest Transplant Risks Follow Surgery

(Continued from Page 1)

A heart transplant operation is technically easier to perform than the close to 800 bypass procedures carried out each year at the MGH to overcome coronary artery disease. The transplantation does not involve judgment calls often faced during a bypass. Also, transplant sutures are much larger than those used in a bypass, thus requiring less optical magnification.

"Once a patient gets through bypass surgery and off a respirator, recovery is usually straightforward," said Dr. G. William Dec, Jr., Medical Director of the MGH Heart Transplantation Program. "But once a heart transplant operation is completed, the most dangerous period begins."

Dr. Dec said that the transplant patient is at greatest risk during the first three months after surgery because of the body's tendency to reject the new heart as a foreign tissue. As powerful drugs suppress the immune system, the body's protection against infection is also lowered.

The anti-rejection drug cyclosporine is usually given in combination with two other medications, azathioprine and the corticosteroid prednisone.

Two agents developed by an MGH Transplantation Unit group headed by Dr. A. Benedict Cosimi, Chief of Clinical Transplant Surgery, also fight organ rejection.

These drugs, used worldwide, are a monoclonal antibody called OKT-3 which is targeted specifically at cells in the body related to rejection and a substance called antithymocyte globulin which also acts against immunologically activated cells.

Dr. Cosimi's group, including Drs. Francis L. Delmonico and Hugh Auchincloss, Jr., prescribe the kinds and dosages of immunosuppressive drugs for transplant patients. They work closely with the cardiac team in caring for heart transplant patients.

Sally Keck, RN, serves as coordinator of the heart transplantation program. She makes sure that patients receive needed medications, periodic biopsies of heart tissue to reassess its quality, and annual checkups to guard against the possible development of coronary artery disease.

Since 1983, the number of American centers doing heart transplantations has soared from 14 to some 125. Fearing that this proliferation may jeopardize the quality of the surgery, some health officials have proposed requiring a yearly minimum of heart transplantations per center to assure up-to-date experience.

Dr. Paul S. Russell, Chief of the MGH Transplantation Unit, said that this concern should be viewed differently for major hospitals that engage in other types of organ transplantations and in which extensive experience in heart surgery is continually maintained.

"The surgical events required in transplanting a heart are all standard steps," he said. "Suppressing the immune system to protect a transplant becomes second nature when a center has already transplanted other organs."

MGH surgeons transplant the heart, kidneys, liver, pancreas, and bone. Bone does not require immunosuppressive measures. Soon the hospital expects to conduct bone marrow transplantations.

In addition to the challenges posed by the need to manipulate the immune system, a major obstacle in heart transplants is insufficient donor organs.

"We've seen a slow increase in heart donations in recent years," said Dr. Dec, "but unfortunately the growth in the number of would-be recipients has outpaced that of donors as more and more people realized that this operation does work.

"The wait for a transplant now averages around 120 days. Nearly a quarter of the people on our waiting list die before a heart becomes available for them."

While waiting for a heart, three MGH patients with a severely weakened left pumping chamber (ventricle) were kept alive with an intra-aortic balloon and later underwent successful transplantations. The 10-inch balloon was developed in the late 1960s by Dr. W. Gerald Austen, now MGH Chief of Surgery, and Dr. Mortimer J. Buckley, Jr., now Chief of the hospital's Cardiac Surgical Unit, working with a team from the AVCO Everett Research Laboratory. The balloon is passed into the body's main artery near the heart. Controlled externally, the device pumps when the left ventricle is resting and remains inactive while the chamber pumps. As a result, the left ventricle needs less pumping pressure and thus works less hard.

Dr. Buckley said that centers in Europe, particularly in London and Paris, are moving ahead faster with heart transplantation programs than hospitals in America.

"European institutions seem to have greater accessibility to donor organs and to be more aggressive in putting patients on circulatory assist devices," he said.

"Although we have used the balloon pump, we cannot use the Abiomed pump, another left ventricular assist device which we helped develop, unless we get special permission from the government. The Abiomed pump is being used extensively in Europe."

Dr. Buckley added that European centers are also using the University of Utah's Jarvik-7 mechanical heart as a "bridge" pending transplantations.

The short period of a heart's viability between its removal from the donor and placement into the recipient is a factor in restricting the supply of the organs in this country. In contrast to an 18 to 20 hour grace period for a liver, a heart must be used within 4-1/2 to 5 hours, ideally sooner.

Dr. Gus J. Vlahakes, who performs the heart transplantations at the MGH, recalled that a needed heart was once available in St. John's, Nfld. An air charter service estimated the flight time to Boston at about 2-1/2 hours. When stormy weather required taking a circuitous route changing the flight time to more than 3-1/2 hours, the trip had to be cancelled.

There have been suggestions that if the criteria for donor organ acceptance were liberalized the organ supply would increase and the waiting time would shorten.

The Boston consortium accepts hearts only from donors under the age of 45. Recipients can be as old as 60, even a little older under certain circumstances.

Dr. Vlahakes believes there is room to ease the acceptance criteria but cautioned that "if you go to donors who are older, you may begin to see problems after transplantation such as hearts that are electrically irritable and have premature beats.

"Looking at it another way, the recipient will no longer have heart failure but may simply have premature heartbeats for which medication can be taken. The solution is not perfect, but it does the job of keeping the patient alive with an improved quality of life." ■

Awaiting his second annual series of tests following heart transplant surgery, Patrick White of Leominster, MA, chats with his nurse, Margaret McDougall, RN, left, and the coordinator of the MGH's heart transplantation program, Sally Keck, RN.

Broad-Based Study Seeks Better Way to Treat Anxiety

WHEN DOES ANXIETY cross the line from normal to abnormal?

How can abnormal anxiety be measured to determine the most effective treatment?

Will a person who has suffered episodes of anxiety for years be more likely than others to develop a panic attack or phobia?

With 15 percent of the nation's population suffering an anxiety disorder at some time during life (and 10 percent having panic symptoms), high priorities are finally being given toward filling tremendous gaps of knowledge about this common condition.

"Research on anxiety is at the stage today where studies on affective disorders, such as depression, were at in the mid 1970s," said Dr. Martin B. Keller, Director of Outpatient Research in the MGH Psychiatry Service.

"If we are ever to truly understand anxieties and be able to design treatments to shorten recovery time and prevent or attenuate chances of relapse or recurrence, we must have more information about the course of these illnesses."

Recently the drive toward this goal gained major impetus when The Upjohn Company of Kalamazoo, MI, awarded an approximately $900,000 grant for a study of 400 patients diagnosed as having severe anxiety or panic disorder.

Dr. Keller and the MGH's Chief of Biostatistics, Philip W. Lavori, Ph.D., are coordinating the 18-month Harvard Anxiety Research Project which involves departments of psychiatry in eight institutions affiliated with Harvard Medical School.

In addition to the MGH, they include Beth Israel Hospital, Brigham and Women's Hospital, Massachusetts Mental Health Center, and New England Deaconess Hospital, all in Boston; Cambridge City Hospital in Cambridge, MA; McLean Hospital in Belmont, MA; and the Brockton Veterans Administration Hospital in Brockton, MA.

Serving as backup sites during patient recruitment are the University of Massachusetts Medical School in Worcester, Washington University Medical School in St. Louis, and Rush-Presbyterian-St. Luke's Medical Center in Chicago.

In visualizing prospects of the anxiety research, Dr. Keller recalled the status of depression during the mid 1970s. No long-term treatments were available then for depression, which makes up 95 percent of affective disorders. No treatment trials lasted more than 16 weeks. Scientific data detailing long-term experiences of depressed individuals were virtually non-existent.

"Since then," said Dr. Keller, "we have had five or six outstanding clinical trials on depression which have taught us

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Research Focus on Anxiety Long Awaited

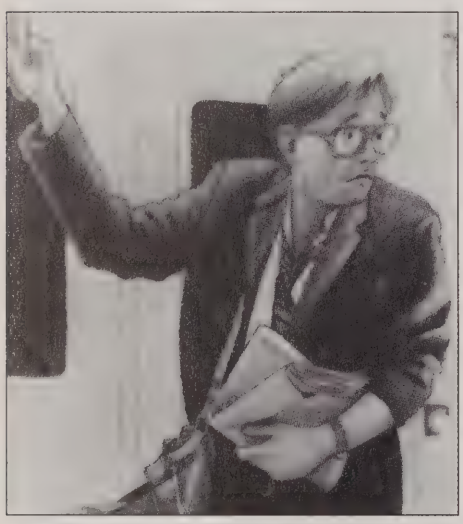
(Concluded from Page 5)

effective long-term treatment strategies using both medicines and psychotherapy.

"In addition, over the last 15 years studies on the natural course of affective disorders have taught us much about what happens during such episodes, how long it takes to recover, and who becomes chronically affected."

Prior to 1980 if a major anxiety disorder coexisted with depression, the illness was diagnosed solely as depression. The only way an anxiety disorder could be diagnosed as such in this coexistent state was if it preceded depression by eight weeks and lasted at least eight weeks after the depression subsided.

Anxiety also was largely regarded as a single entity, rather than a series of progressively serious phases. Thus, it was not unusual for complaints of severe anxiety to be summarily dismissed with such comments as, "It's just your nerves" or "You've been working too hard."



From the depression studies, however, came a realization that some anti-depression drugs were also helpful in treating short-term episodes of extreme anxiety. These drugs included tricyclic anti-depressants and so-called MAO (monoamine oxidase) inhibitors.

In addition, a new drug, alprazolam (Xanax), was licensed in 1982 for the treatment of anxiety symptoms and has since been found to be also effective in blocking panic attacks.

A panic attack is characterized by a sudden onset of overwhelming fear or apprehension. The heart pounds, throat tightens, body trembles. The affected person wonders, "Am I losing my mind?"

These attacks often lead to a phobia, an irrational avoidance of situations, settings, or activities that, in the patient's mind, are likely to trigger a panic attack.

One of the most complex phobias is agoraphobia (from the Greek meaning "fear of the marketplace"). Agoraphobics are so fearful of finding themselves on the brink of a panic attack that they often confine themselves to their home. If they hold a job, they may travel directly to the job and later head straight home.

The heart pounds, throat tightens, body trembles. The affected person wonders, "Am I losing my mind?"

Last year, the Clinical Psychopharmacology Unit at the MGH launched an aid program for agoraphobics featuring house calls by psychiatrists (*MGH News*, June-August 1988).

The National Institute of Mental Health also moved last year to place greater emphasis on investigations into anxiety. The Institute changed the name of its Affective Disorders Research Branch to The Mood, Anxiety, and Personality Disorders Research Branch.

In plotting the natural course of anxiety to learn at what point it becomes abnormal and later serious, the Harvard Anxiety Research Project hopes to identify effective long-term treatments for these illnesses and how patients can taper off safely from short-term remedies.

Dr. Keller explained that patients sometimes become tolerant of the effect of drugs currently prescribed for anxiety disorders. This can pose a serious dilemma.

"Trying to regain a therapeutic effect means having to push the dosage higher," the doctor said. "And any attempt to stop the drug may very well trigger withdrawal or rebound symptoms."

In the past decade, Dr. Keller said, practitioners, researchers, and teachers have become alarmed over a frequently excessive use of anti-anxiety agents such as diazepam (Valium) and chlordiazepoxide (Librium) by people with general worries and fears.

In trying to discontinue the drugs, these people risk withdrawal symptoms that ironically may mimic the symptoms of the anxiety itself. This has led some practitioners to deny the drugs to people who really need them.

"The physicians fear that the patients may become addicted," Dr. Keller said. "All of which points up the need for this new long-term study with a large size patient sample to see which anxiety conditions are serious and which aren't."

Most of the participants in the study will have experienced panic disorder, with or without agoraphobia. Panic disorder is defined as a series of three or four panic attacks within a couple of weeks.

No one knows what triggers a panic attack. Without a phobia to attach some meaning, panic attacks are considered psychologically to be the least rational of all the anxiety states.

"They are hard to explain or reconstruct because by themselves they don't make sense," said Dr. Keller, who is also Associate Professor of Psychiatry at Harvard Medical School. "There isn't a tiger in front of the patient instilling fear. There isn't a traffic officer pulling up alongside. If these were the case, then the panic would be more phobic."

A major goal of the new studies is to learn whether long-time generalized anxiety tends eventually to worsen. Medical literature offers no clues on this. Dr. Keller said while such anxiety is unpleasant, people so affected may prove to be no more predisposed to phobia or panic than someone who is not generally anxious.

In many instances, however, the course of anxiety disorders is not limited to outbreaks in a given month or two but, it is hypothesized, may typically last for many years, even a decade or two.

"If that proves to be the case," Dr. Keller said, "then it certainly will be worth all of our effort to come up with treatments that will not only be effective but, equally important, long-lasting." ■

Devising Bone Repairs on Plastic Models

WHEN PATIENTS undergo surgery and customary corrective techniques fail, surgeons have but one recourse: innovate.

Success or failure may hinge entirely on how much ingenuity the physician displays in the operating room.

Recent advances in diagnostic technology are beginning to alter that picture, however, giving some surgeons — and their patients — better odds for a successful outcome.

When a needed bone repair appears particularly complex, an MGH orthopedic surgeon, Dr. Jesse B. Jupiter, now turns to a work bench, not only to plan strategy but also to try out the operative procedure that he settles on as optimal.

Dr. Jupiter's ability to rehearse an operation without involving the patient is made possible by the availability of an exact model of the structure to be repaired.

CT (computed tomography) scans not only provide clear three-dimensional images of bone but also precise (digitized) measurements of the object scanned. From this data, companies are now able to make plastic replicas of the structure down to the most minute detail.

The conventional method of bone study has been to look at an X ray, find where the deformities are, then expose the bone in surgery and with the naked eye try to correct the problem. X rays of a deformed bone, however, provide only two-dimensional views of a three-dimensional problem. With a model, the doctor has a copy of the patient's own bone with every dimension true to the original.

> *With a model, the doctor has a copy of the patient's own bone with every dimension true to the original.*

Dr. Jupiter told of having a model made of a little girl's malformed leg bone and how use of this replica helped to solve a vexing problem.

The patient, Jenny Fitzsimmons of Troy, NY, was born six years ago with her right leg so deformed that her foot faced backwards. Her condition first came to Dr. Jupiter's attention when she was 16 months old.

He corrected the deformity and reinforced the leg's main bone (the tibia) with a vascularized bone graft. This involved attaching to the tibia the leg's second major bone, the fibula, which had a healthy blood supply.

Acting as a shock absorber for the ankle and as a source for the attachment of muscle, the fibula does not normally experience much stress. But given the duties of the tibia, the fibula will quickly respond to stress and in time even grow to tibia size (*MGH News*, April 1985).

Jenny initially did very well, but after a few years a new deformity developed above and below where the fibula was attached.

Masses of fibrous connective tissue (ossifying fibromas) in the leg were preventing normal bone growth. Braces and other supports failed to keep the leg from angulating in two directions and twisting.

Doctors in New York suggested an amputation, but the child's parents instead brought her back to the MGH.

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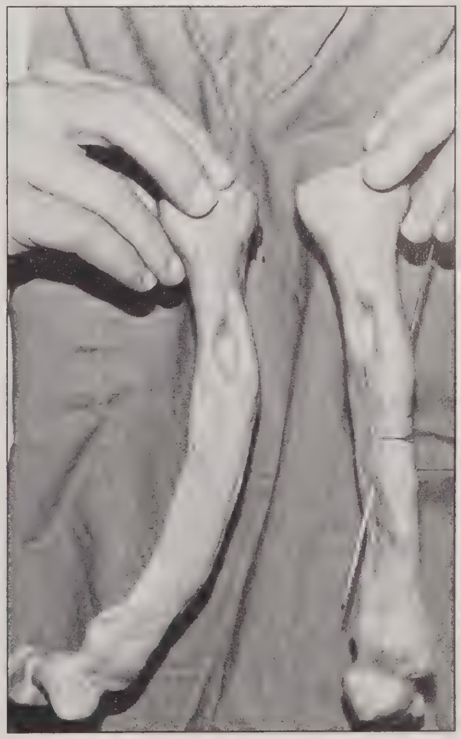
***Below:** In advance of a major leg straightening operation, Dr. Jesse Jupiter uses an exact plaster replica of the leg bone to devise his repair strategy.*

***Right:** At left, a plastic replica of a child's deformed leg bone. At right, a twin model of the bone after it was straightened at a workbench.*



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Use of Models Cuts Bone Repair Costs

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"The bone had become so crooked," Dr. Jupiter said, "that the child, then 5 years old, could not walk. The leg was abnormal in so many ways that it was difficult to figure out exactly how to straighten it."

Dr. Jupiter had a California-based firm called Techmedica make a model of Jenny's leg bone. From the model, he was able to determine the location of the disease and where the bone still appeared quite healthy.

With this information, the MGH surgeon planned and executed needed cuts in the model to straighten the artificial bone, decided on the types of plates and screws that could best hold the bone segments together, and was able to custom shape the fixation devices to assure a precise fit.

Jenny's subsequent operation lasted two hours. It might have lasted four hours if difficulties had not been worked out earlier.

Six weeks after the surgery, a cast was removed from the little girl's leg. She walked for the first time without a limp and no longer needed a brace. Since then, Jenny has become very active in sports, even participating in competitive events.

Anatomical models made from synthetic materials are not new. Replicas of skeletons first appeared years ago, but they gave no inkling of the tissues that surround bones. Model designs therefore have been expanded to include not only bone but also artificial veins, arteries, muscles, tendons, ligaments, and skin.

"This is the present state of the art for training purposes," Dr. Jupiter said, "It came about only three years ago. But these models still portray general anatomy. They do not represent the individual patient."

Dr. Jupiter said custom-built models made possible with computer-scan data are useful in a variety of orthopedic situations, such as:

- when a bone deformity involves more than one plane or dimension;
- when a fracture has healed in a crooked or otherwise inappropriate way;
- when a patient has undergone a number of operations for a condition and a surgeon wants the outcome of the next procedure to be as predictable as possible;
- when a bone is not only deformed but abnormally soft as well;
- and when special fixation devices are needed.

Strategy-making and practice with a model can have an important economic impact. By shortening the time of the operation by as much as half, the surgeon can make the savings to the patient or a third-party payer appreciable. And the predictability of a good outcome can lessen the chance of more surgery in the future.

Six-year-old Jenny Fitzsimmons, who had a badly deformed leg repaired at the MGH, limbers up to play ball at Troy, NY.

Dr. Jupiter, who is Assistant Professor of Orthopaedic Surgery at Harvard Medical School, said almost any bone can benefit from use of a model, but bones in the extremities have a particular advantage because in addition to a copy being made of a diseased or traumatized bone, a model can be constructed of its healthy counterpart for comparison purposes in the rebuilding effort.

Models can be produced with built-in fractures matching injuries suffered by a patient and thus enable a surgeon to figure out the best way to deal with the problem before going to an operating room.

Plastic replicas have been made of deformed hip and pelvic bones to help surgeons plot repairs. Anytime a bone problem is near a joint, such as a knee, ankle, or elbow, work with a model may be useful.

Dr. Jupiter predicts models will occupy an increasingly important role in the education of bone surgeons.

In the past, he said, young practitioners have obtained their hands-on surgical training primarily by working on cadavers and by assisting experienced surgeons during operations on patients.

He said cadavers have a crucial place in surgical education, but models offer a particular advantage. First, cadavers are not always available for study. Second, when they are, they do not present the bone deformities that a trainee may want to learn to correct.

"There is so much more to learn today," Dr. Jupiter said. "Conceptual training, learning to think about and define a problem, is very important, but in the operating room, the technical expertise is most important.

"The greater the complexity of the task at hand, the more vital it is to be precise. With the instrumentation and techniques that are available, we have the ability to be technically precise. But it takes planning and experience. By taking advantage of the new opportunities that exist outside the operating room, the results one can get in at least some types of surgery become predictably better." ■

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Treating Obsessions That Lead to Compulsive Acts

AN ILLNESS described only a few years ago as probably the least understood of all the major psychiatric problems is finally yielding to advances in medicine.

While the cause of obsessive-compulsive disorder (OCD), which affects five million Americans, is still unclear, studies are pointing increasingly to a chemical imbalance in the brain.

Potent drugs that affect this imbalance have been given to OCD patients in various trials with beneficial responses shown by 50 to 70 percent of the patients.

People with OCD have persistent, unwanted thoughts or obsessions that usually lead to irresistible drives or compulsions to engage in odd ritualistic behavior (*MGH News*, November 1983).

The disorder is marked by such irrational acts as being driven by fear of contamination to wash the hands many times a day, turning off a gas stove and returning home over and over to make sure the stove is really off, and repeatedly retracing a car route because of a dread of having been involved in an accident.

"People who have obsessive-compulsive disorder do all kinds of strange things, but they are not out of their mind," said Dr. Michael A. Jenike, who heads an MGH clinic which treats such patients. "They know that what they're doing makes no sense, and they want to stop but can't."

The MGH psychiatrist said that when he and several colleagues cofounded the Obsessive-Compulsive Disorders Clinic and Research Unit six years ago "we rarely got more than two patients a month, but now we have five to eight new patients a week, and that has been going on for the past two years or so."

In addition to Dr. Jenike, the clinic's principal staff members include Dr. Lynn Buttolph, Lee Baer, Ph.D., and William E. Minichiello, Ed.D.

At one time, the standard treatment for OCD was psychotherapy (designed

(Continued on Page 2)

MGH-Shriners Team Aids Burned Children In Moscow Hospital

As a Soviet Aeroflot jetliner winged toward Moscow carrying a medical team from the MGH and its affiliated Shriners Burns Institute (SBI), the group wondered how they would be received in the capital of the Soviet Union.

The team was en route to Moscow's Hospital No. 9, the largest burn center for children in the country, to help treat 23 youngsters who two weeks earlier had been among the most critically

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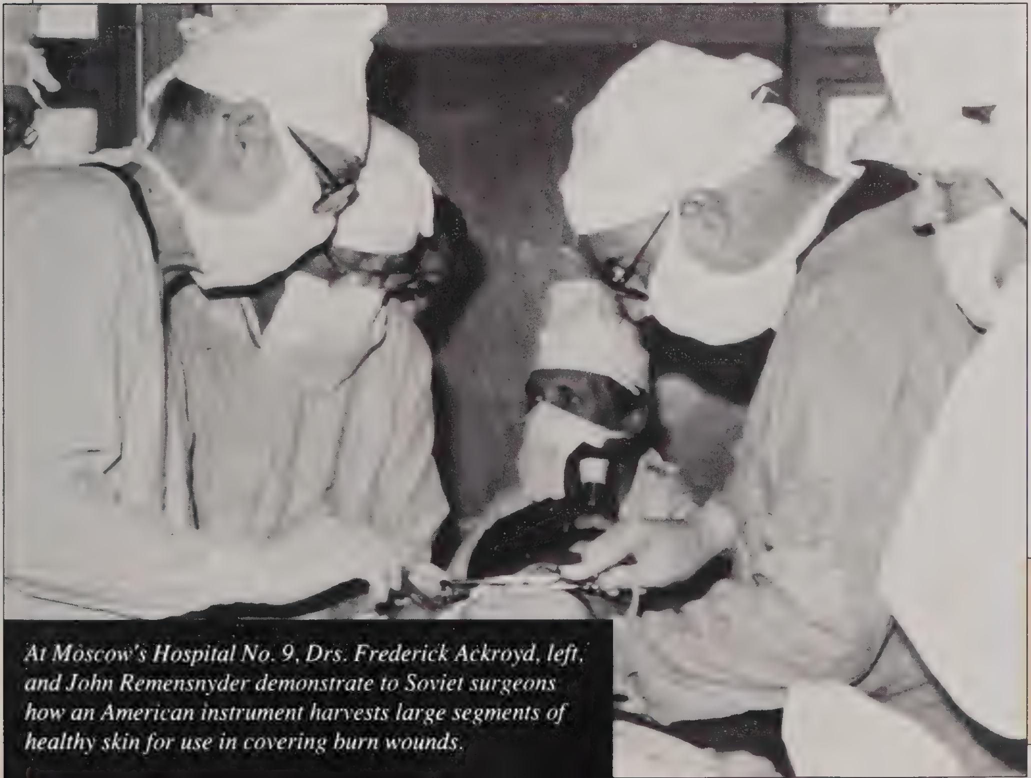

At Moscow's Hospital No. 9, Drs. Frederick Ackroyd, left, and John Remensnyder demonstrate to Soviet surgeons how an American instrument harvests large segments of healthy skin for use in covering burn wounds.

INSIDE:

Page 5 - Raynaud's phenomenon is still a puzzler.

Page 7 - Conquering incontinence

EDITORIAL:

The Language of Medicine

WHEN MGH and affiliated Shriners Burns Institute professionals treated more than 50 children in the Soviet Union this summer, they were carrying on a tradition. A number of MGH doctors and nurses have ministered to the very sick in the Soviet Union or lectured there. The late Dr. Paul Dudley White had established relations with leading Soviet cardiologists beginning in the mid 1950s. His pioneering contacts ultimately made possible the Soviet-American collaboration that led to a Nobel Peace Prize shared by physicians from both nations.

Whether by individuals or groups from the MGH these contacts have broadened (as have MGH missions to many other countries). An MGH anesthesiologist has gone to the Soviet Union to save the life of a desperately ill physician who was the daughter of an eminent Soviet cardiologist. Many MGH doctors from a variety of specialties have flown to that country to treat patients or to teach. And some have gone to learn. Like an MGH neurosurgeon who was taught a procedure developed there.

More recently, though, MGH and Shriners Burns professionals have participated in more expansive errands of mercy. Two disasters, one generated by nature, the other by man, have necessitated their intervention. The first was the massive earthquake which tore chasms in what had been flat land, uprooted buildings until they crashed, and destroyed entire cities in Soviet Armenia. In that catastrophe of last December, men, women, and children died when crushed under tons of rubble. But not all. Some — even the tiniest of infants — were found clinging to life weeks later. In one perverse allegory of that world turned upside down, a child sent to stand outside his school as a disciplinary measure was the only survivor as several hundred pupils were buried when the earthquake struck and the school thundered to the earth.

Project Hope sent teams from 10 American medical centers. Among them were teams from the MGH and the neighboring Shriners Burns Institute. The physicians triaged four of the very severely injured children to the MGH. It was not until four months later that the last two — after a series of operations — flew home. Crushing injuries required the most sophisticated care. The only girl among them had entered the MGH with a 3 1/3-inch hole in her forehead exposing her throbbing brain. She left with a totally normal-appearing skull. Where the gaping hole was, plastic surgeons and neurosurgeons had crafted a new forehead from the top of her head now covered by hair.

The man-made disaster involved a gas explosion that wrecked a train bearing mostly vacationing children through Siberia. A page 1 article describes how MGH surgeons and Shriners nurses operated on the most critically burned victims. Medicine is among the universalities of mankind. Wars rage among nations, and walls separate them. But medicine heals the physically and psychologically wounded. Along with other components we call culture, and with increasing commonality of interests, medicine can help smash the walls and one day perhaps — just perhaps — may help erase the need for war.

—Compulsive Behavior

(Continued from Page 1)

to produce a response by mental rather than physical effects), but this proved notoriously ineffective. Some antidepressant drugs also were tried but with only spotty improvement noted.

In the last few years, however, at least three other antidepressants have demonstrated effectiveness against OCD. They appear to influence the function of certain areas of the brain by adjusting levels of a signal-carrying substance called serotonin.

One region, the frontal lobes above the eyes, has to do with planning and judgment. Another area, a center deep in the brain called the caudate nucleus, has always been linked with motor activity, but researchers now believe it is also associated with thoughts and cognitive processes.

At least three groups of investigators have shown that the caudate and frontal lobe areas are more active in OCD patients than in healthy individuals.

"It was once thought that an underactivity in the serotonergic system was behind OCD," said Dr. Jenike, "We now think the system may actually be hyperactive. The drugs currently being used seem to down-regulate or slow the serotonergic receptors."

One drug, clomipramine, has been available for some time in Canada, Mexico, and many overseas countries. In the United States, however, the Food and Drug Administration presently limits the drug to investigative trials and, for compassionate reasons, to very ill patients.

In addition to such potential side effects as a faster heartbeat, constipation, and memory difficulties, particularly

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among the elderly, when used in high doses clomipramine on occasion has been followed by seizures. At the MGH, as a precaution the maximum dose is held to 250 milligrams. Dr. Jenike expects clomipramine to be licensed in the United States sometime in 1990.

Dr. Jenike's group is studying a second drug, fluoxetine, in about 200 patients with very good results to date. Fluoxetine became available a year and a half ago and is often prescribed for OCD. The present research is aimed at determining the best dosage. "More is not always better," Dr. Jenike said. "Some drugs actually work better at a low dose than at a high dose."

The third drug, fluvoxamine, still under investigation, has been used by 40 patients at the MGH with statistically significant improvements noted.

In terms of side effects, both fluoxetine and fluvoxamine are milder than clomipramine. Also, the first two drugs are given in the morning because if administered at night they would tend to cause insomnia. Clomipramine, on the other hand, must be given at night because it has a sedating effect.

To maximize recovery, almost all patients treated in the MGH OCD Clinic receive both medication and behavior therapy. Patients taking part in investigational drug studies cannot receive behavior therapy until these trials end.

The trials run for 12 weeks before any decision is made on how a patient has fared. Occasionally, someone will respond in as early as a week or two, but that is unusual.

Many OCD patients are plagued by obsessions of contamination and thus resort to repeated hand washings. Used in conjunction with drugs, a behavior technique called "exposure and response prevention" has become the treatment of choice for this problem.

A therapist gradually exposes the patient to something he cannot tolerate, such as touching the floor. He is then persuaded not to wash his hands for a couple of hours. Anxiety builds. But in the next session when the practice is repeated the anxiety is not as great or as lengthy. After a while the patient can touch the floor without becoming nervous and without feeling a need to wash.

"A few patients respond completely to medication alone or to behavior therapy alone," said Dr. Jenike, "but in my opinion more than 90 percent need the combination."

Sometimes the use of two drugs speeds a patient's recovery. Thoughts of death plagued a 37-year-old woman whenever she went driving. Fears that her automobile had hit somebody kept racing through her mind. At times she would stop her car and ask strangers whether they had witnessed an accident.

The woman responded to treatment with fluoxetine, and then an anti-anxiety drug called clonazepam was given to help boost the response. After initially scoring very high on an obsessive-compulsive disorder scale of symptoms, the patient has almost completely recovered and now drives with confidence.

Fluoxetine also was prescribed for a 25-year-old man who felt driven to check his stove repeatedly and who would spend minutes turning a key in his door lock. In addition to these compulsions, he had an obsession that he was going to become gay. The disruptive thoughts began five years before he came to the MGH for help. The patient is now dramatically better and visits his therapist every six months but remains on medication.

"No one knows how long to keep patients on these drugs," said Dr. Jenike, who is also Associate Professor of Psychiatry at Harvard Medical School. "In one study, almost all of the patients relapsed, but their medication had been tapered off over a one-week period and none of the individuals had also received behavior therapy."

Dr. Jenike said the OCD Clinic had a number of women patients who did not want to be on drugs while pregnant. After their medication was stopped, half of the women reported a return of their symptoms. The other half continued to do quite well.

"It seems that there is a substantial group who have to be on low-dose drugs for life," the doctor said. "Fortunately, from what we know, these are benign medicines."

Recovery from obsessive-compulsive disorder requires the patient's complete cooperation. Dr. Jenike told of a young woman who acted normally outdoors but in her house would spend 12 to 14 hours a day washing her hands:

"She used soap but only after washing the soap with bleach. And before using the bleach, she would wash the bleach bottle with scouring powder."

Dr. Jenike once visited the patient's home to find all of the windows open to air out the building and the odor of bleach permeating the neighborhood. The woman's hands were white and bleeding.

"She knew what she was doing but couldn't explain what was driving her," the psychiatrist said. "She probably would respond to the new medicines and behavior therapy, but there is something about her makeup that prevents her from agreeing to treatment." ■

Obsessive-compulsive disorder might include many hours a day devoted to repeating certain activities, such as checking stove gas jets, hand washing, or counting money.

— Burn Team Lands Unannounced in Russia

(Continued from Page 1)
injured victims of an explosion in the Ural Mountains 745 miles southeast of Moscow.

More than 600 people died, and many others were hurt aboard two Trans-Siberian Railroad trains when electrical sparks from the trains ignited liquefied natural gas that had leaked from a nearby pipeline.

Although Project Hope, the Virginia-based humanitarian agency, had organized the MGH-Shriners mission, its leader, Dr. John P. Remensnyder, said the government of the Soviet Union had not formally extended an invitation to his volunteer group.

An MGH plastic surgeon, Dr. Remensnyder is also Chief of Staff at SBI in Boston. He was accompanied to Moscow in mid June by Dr. Frederick W. Ackroyd, an MGH general surgeon, and two nurses from Shriners, Patricia Salvo, RN, and Cherie Tuohy, RN.

"We easily obtained Aeroflot tickets in New York, but we had no visas to enter the Soviet Union," Dr. Remensnyder said. "All we had was an 'understanding' with the Soviet Ministry of Health that if we showed up at Moscow Airport we would be provided with visas, transportation, housing, food, interpreters, and access to Hospital No. 9 to help take care of the kids."

Things went smoothly at the airport, but later when a flatbed truck pulled up at the hospital carrying 28 crates of medical supplies, part of a nearly seven-ton shipment by Project Hope, the Russians were unsure how to react.

"We literally took matters into our own hands," said Dr. Remensnyder. He and Dr. Ackroyd hopped onto the truck and began unloading the supplies themselves while their nurses checked the inventory. Some of the Russians looking on finally offered a hand. When the hospital's chief appeared and rolled up his sleeves, it was clear the ice had been broken.

"I cannot overemphasize the cordiality and cooperation extended to us during our two weeks at Hospital No. 9," Dr. Remensnyder said. "We worked daily with six Russian surgeons, four women and two men, and there was never a conflict or a cross word. Neither we nor the Russians could speak the others' language, but we had a marvelous interpreter."

Twenty-six children had been airlifted to the Moscow burn center from the city of Ufa, near the explosion scene, but three died before the Americans arrived in Moscow. During their two-week stay, they performed 140 procedures under anesthesia.

By the time the team left, 21 of the children had all of their burns covered with skin grafts The other two were partially covered but doing well.

Dr. Remensnyder's team was assisted the first week by Dr. Kurt Reinke, a third-year MGH surgical resident. He and Dr. Susan E. Briggs, an MGH general surgeon who is also Assistant Chief of Staff at SBI in Boston, had arrived at Ufa to treat survivors six days after the June 4th blast.

Drs. Briggs and Reinke had teamed up with a Shriners group from Galveston, Texas. In one week, they conducted 40 to 45 surgical procedures on 31 children. Other American medical groups were also working in the Ufa area.

The Soviets had formally invited these contingents. Mindful of the 26 most seriously burned youngsters flown to Moscow, however, the Americans recommended still another aid mission which led to formation of the Remensnyder group.

In addition to the expertise in burn care that this group offered, the supplies furnished by Project Hope included some badly needed antibiotics.

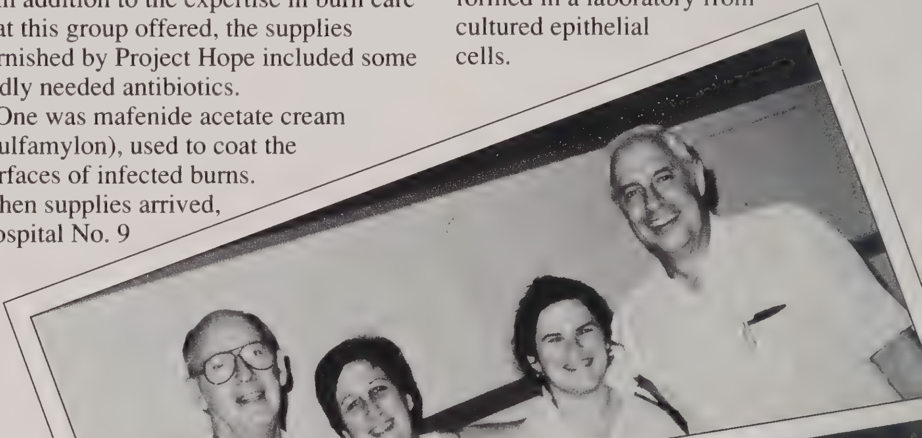
One was mafenide acetate cream (Sulfamylon), used to coat the surfaces of infected burns. When supplies arrived, Hospital No. 9 was down to its last two jars of the cream, and many of the children needed treatment for infections.

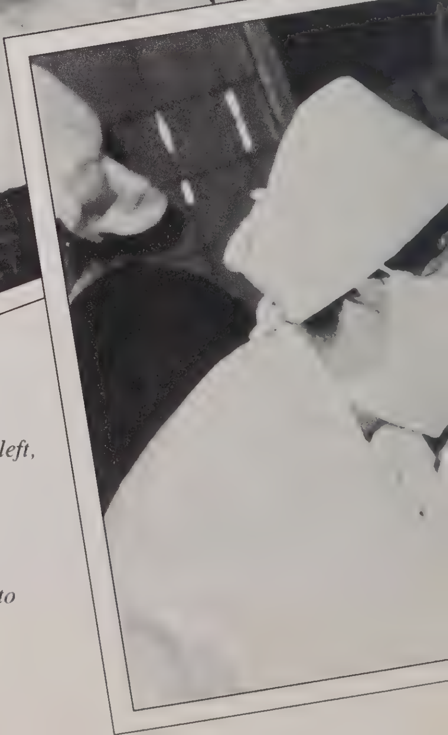
In addition to drugs, the supplies included such items as feeding tubes, intravenous solutions, IV starter sets, dressings, gowns, gloves, and masks.

While the Russians were skillful, their burn care techniques were not always as advanced as in the West. Their practice, for example, was to allow two to three weeks for any dead tissue to fall off a burn before they put on a skin graft. In the meantime, the wound was covered by an antibiotic and a cotton dressing.

"We remove the dead tissue within the first few days (a technique pioneered by Dr. John F. Burke, Chief of the MGH Burn Unit) and make early provision for either a permanent or temporary covering," Dr. Remensnyder said.

The covering would be from healthy areas of the patient's own skin in most instances, but if the burn were very extensive, at home the surgical team might turn to a special pigskin, cadaver skin from a skin bank, artificial skin, or skin formed in a laboratory from cultured epithelial cells.





Above: The MGH-Shriners team in Moscow: From left, Dr. Frederick Ackroyd; Patricia Salvo, RN; Cherie Tuohy, RN; and Dr. John Remensnyder.

Right: Shriners Burns Institute staff nurses Patricia Salvo, left, and Cherie Tuohy apply a plaster splint to the leg of a young Soviet burn victim.

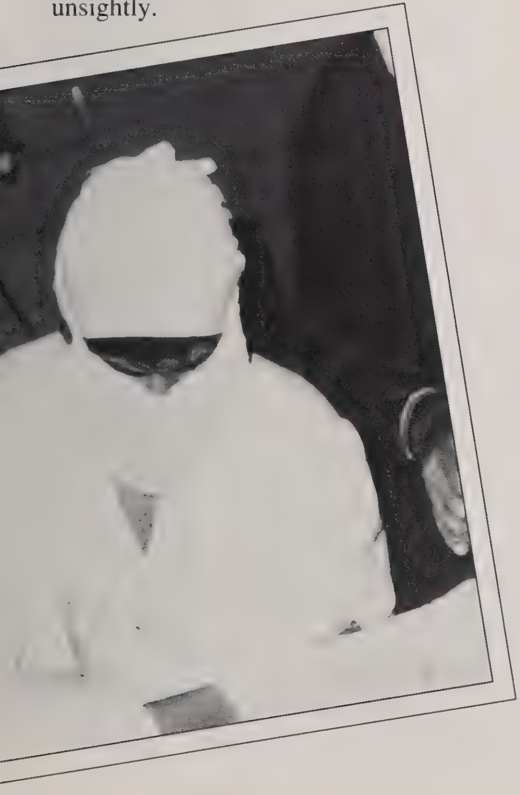
"One of the things Fred and I learned from our trip was how well the techniques we were taught back in the late 50s still work," Dr. Remensnyder said. "We also learned that in coping with a major disaster involving a big population, you can't always have the luxury of very sophisticated care. The way we and our Russian colleagues treated the children at Hospital No. 9 was probably the best way under the circumstances."

The Russians obtained small sheets of skin for wound grafting by using a machine called a dermatome which held a blade the size of a double-edged razor blade. A special meshing machine then perforated the small grafts, causing them to resemble a wide-meshed stocking. Expanding the grafts in this way permitted coverage of a larger wound area. The perforations filled in as the skin healed.

The American doctors introduced the Russians to two kinds of larger, more efficient dermatomes which made possible the rapid harvesting of even larger skin grafts.

The value of the American dermatomes (later given as gifts to the Soviet surgeons) became quickly apparent when a surgical team treated a 13-year-old girl who had suffered full-thickness skin burns over 65 percent of her body, including her face.

With an American dermatome, the specialists were able to obtain a fairly large single portion of skin to cover her face. If meshed skin had been used there, it would have been quickly noticeable and unsightly.



The prospect of larger skin grafts helped to quell another major Russian concern. The Moscow doctors feared patient bleeding. They did not have easy access to blood donors, and the children in their care were for the most part anemic and low on proteins.

The Americans introduced the Soviets to one of the simplest and oldest methods of reducing a threat of bleeding. The technique simply involves applying a weak solution of epinephrine, or adrenalin, to the wound. The solution quickly acts to tighten up blood vessels.

"I think our presence at Hospital No. 9 definitely made a difference," said Dr. Ackroyd, who like Dr. Remensnyder is also Associate Professor of Surgery at Harvard Medical School. "For the most part, what we did boiled down to our pushing...more aggressively and more rapidly...known, available techniques that were not being employed for the benefit of the young patients."

A specialist in burns and trauma, Dr. Ackroyd said that until the MGH-Shriners team arrived the Russians did not use any splinting or active or passive physical therapy on the children's burns. Their injured legs and arms were left in any random position.

The Shriners nurses made splints out of plaster for every youngster with a burned extremity. In fashioning a hand splint for a patient, Patricia Salvo explained that unless something held the hand straight, it would curl up as the burned skin healed.

Cherie Tuohy spent considerable time explaining the importance of wrapping a burned hand in a gloved instead of mitted fashion after the first 48 hours of care. The Russians agreed that separation of the fingers facilitated function and healing and were eager to adopt that bandaging practice.

The visitors also urged the Moscow hospital staff to change burn dressings every day instead of following the Soviet routine of every other day. At the MGH and SBI, burn dressings are usually changed at least twice daily.

Dr. Remensnyder described medical care in the Soviet Union as very uneven. He told of visiting a 100-bed heart institute in Moscow last February and seeing highly sophisticated, state-of-the-art operating rooms that would "knock your eyes out."

On the other side of town, however, was the country's best and biggest children's burn unit which could benefit a lot from even a small portion of western technology. ■

Raynaud's Phenomenon: Still a Puzzler

HEATING SYSTEMS will snap on in thousands of American households in a few weeks, signalling a return of cold weather...and also for many people a renewed dread of "Raynaud's phenomenon."

Believed to affect in some degree as many as one person in every 200 to 300, the disorder is characterized as an overreaction by parts of the body to exposure to the cold.

A typical example: A person steps into chilly air from a heated home and soon finds that one or more fingers has turned white from sudden loss of circulation. The temperature of the fingers may fall to that of the surrounding air.

Once back in a warm building, the affected digits begin to recover, first changing from white to purple and then to bright red before finally regaining normal color and function.

A certain amount of pain is usually associated with Raynaud's, particularly during the rewarming period.

In addition to fingers, Raynaud's phenomenon may blanche toes or the tip of an ear or nose, all sites of blood vessel endings.

It is not unusual for the body to reduce blood flow through these terminal vascular beds to conserve body heat or step up the circulation to dispel heat. Nerves connected to muscles surrounding these blood vessels signal the muscles to either tighten or relax.

"What happens in Raynaud's phenomenon, however, is that instead of just being reduced, the blood flow is cut off entirely," said Dr. John A. Mills, Director of the MGH Arthritis Clinic, who has treated many Raynaud patients.

"We don't understand this severe circulatory response to cold exposure. It certainly is not normal because not all of the fingers or toes are affected simultaneously. Some local factor is involved as well as the general one that initiates the response."

(Concluded on Page 6)

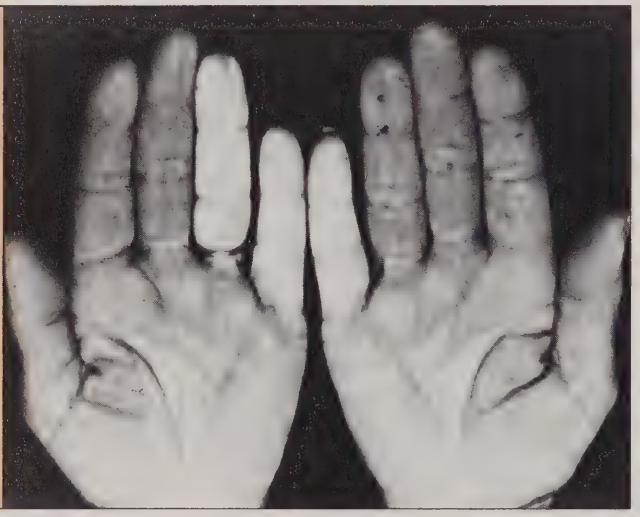
— *Ignoring Raynaud's Can Invite Perils*

(Concluded from Page 5)

Many people suffer a Raynaud's attack when they handle cold articles, such as when they remove foods from a refrigerator or freezer.

"I don't think it's just the result of exposing the fingers to the cold," said Dr. Mills. "I think there is a sense of chill and that the Raynaud's phenomenon is centrally mediated in the body."

Blanching of the fingers can also occur without directly exposing them to a low temperature. Even with the hands held in pockets, a person can enter a supermarket whose air conditioning is running full blast, breathe the cold air for a few minutes, and then discover upon baring the hands that they have turned white.



One of the mysteries of Raynaud's phenomenon is that although the condition can turn fingers white from sudden exposure to cold temperatures, not all of the fingers on a hand may react that way.

In some people susceptible to Raynaud's phenomenon (named after a French physician, Dr. Maurice Raynaud, who first described it in 1862), emotional upsets have increased the likelihood of attacks.

"Emotional disturbances alone can alter blood flow," Dr. Mills pointed out. "People sometimes get cold hands when they're anxious or hot hands when they're stressed.

"I've asked patients whether they have been stricken with Raynaud's while emotionally upset. Perhaps one in six or eight patients has told me, 'Yes, that will do it.' Others attribute their attacks entirely to the cold."

Some 80 percent of those who experience Raynaud's phenomenon (so-called because of the varying changes in skin color) have no other disorder. The remaining 20 percent may have the condition in association with a connective tissue disease, usually scleroderma or lupus erythematosus.

In scleroderma, the skin becomes very hard and thick because the body's cells are overproducing collagen, a principal component of cartilage, bone, and skin. The disease sometimes spreads to internal organs, causing serious complications.

Lupus is an autoimmune disease in which the body attacks its own tissues and joints. In severe forms, lupus can also damage vital organs. Most patients with lupus have a relatively benign course, and extensive research has made even severe lupus far less life-threatening than it used to be.

For reasons not clear, Raynaud's phenomenon strikes perhaps five times as many women as men. Although it is not usually seen in young children, the disorder commonly starts in the teens. Occasionally, it develops for the first time after an individual has already reached the 60s or 70s.

Wearing gloves, a hat, and other extra clothing can help to forestall a Raynaud's attack. But ignoring the problem and permitting frequent and long-lasting Raynaud episodes can result in ulcers forming on the fingertips, particularly among patients who also have been stricken with a connective tissue malady.

Adequate precautions to guard against further attacks then become especially important so that the ulcers can have time to heal. If they became infected, gangrene might follow, and the ends of the fingers might be lost.

Drugs can improve circulation by expanding the blood vessels, but these medicines, for the most part, are primarily intended to lower blood pressure, and many Raynaud's patients already have a low pressure. A further drop could cause such patients to faint on standing up.

A small percentage of Raynaud's patients seek relief through a surgical procedure called a sympathectomy. This involves the cutting of nerves in the sympathetic nervous system that are providing the stimulus for the blood vessel clampdown.

"A sympathectomy is performed much less frequently now than it used to be," said Dr. Mills, who is also Associate Professor of Medicine at Harvard Medical School. "For reasons we don't understand, the operation may be effective for a month or even a year or two, but then the condition tends to recur. Some patients do gain lasting benefits from the surgery, but we just don't know how to identify those people in advance."

Biofeedback, the use of the mind to influence an involuntary bodily function, has helped many people ward off or abort a Raynaud's episode.

In biofeedback, an individual is taught not to think about being cold but rather of being warm and cozy, perhaps sitting in front of a crackling fire. The patient wears temperature-registering devices on the fingers and, if the therapy is successful, can actually view an electronic display of the finger temperature rising.

Encouraged by his mind's ability to control this normally involuntary function, the successful patient, through practice, soon builds confidence that he can call for a temperature-raising response whenever he feels the need.

Dr. Mills emphasized that even though biofeedback appears to help some Raynaud's patients, others derive no benefit at all from the technique.

To avert an attack of Raynaud's phenomenon, the MGH physician proposed these basic precautions:

- Before driving to work in the morning, start the car, turn on the heater, and then go back into the house for several minutes while the vehicle warms up.
- If possible, arrange for parking close to the place of employment.
- Keep the head covered while outdoors so that the body is forced to expel heat through the other extremities.
- If the hands become chilled and you cannot get indoors, try to promote circulation by swinging the arms in a perpendicular fashion with the fingers outstretched.
- Wear enough extra clothing, even when indoors, to create the feeling that you would like to take something off.

"Feeling just a little warmer than you would otherwise like to be helps to induce maximum circulation in the hands and feet," Dr. Mills said. ■

Urinary Incontinence Is Often Conquered By Appropriate Care

MANY AMERICANS have adopted less desirable lifestyles, some becoming even social recluses, because of a common misconception about body function.

Urinary incontinence, the inability to hold urine until an appropriate time, affects at least 10 million adult Americans. Between 15 and 30 percent of community-dwelling older people and at least half of the 1.5 million nursing home residents in this country face the distress daily. Many more women than men are stricken.

Mistakenly convinced that incontinence is part of normal aging and is largely uncorrectable, more than half the people in the communities who have the urinary problem have not bothered to consult a physician.

Instead, most have altered their living patterns, often shunning social events that in the past afforded much pleasure. They frequently stay close to home to avoid the possible embarrassment of a bladder accident and rely on highly absorbent underclothes and disposable bed pads.

A Consensus Development Conference on Urinary Incontinence in Adults held by the National Institutes of Health reported that many physicians fail to recognize the clinical impact of the condition in nursing homes and that, as a result, very few nursing home residents with incontinence have any type of diagnostic evaluation.

A conference panel emphasized that every individual with urinary incontinence is entitled to evaluation and consideration for treatment.

Contrary to what many people think, urinary incontinence can be controlled, if not cured, in most instances.

The disorder often stems from changes in lower urinary tract function caused by such conditions as muscle weakness, neuromuscular diseases, bladder infections, spinal birth defects, accident injuries, and pelvic surgery.

Incontinence falls into several categories. In some women, particularly those who have had a number of pregnancies, any pressure on the bladder can lead to a leakage of urine. So-called "stress" incontinence may occur during exercise, coughing, sneezing, or even laughing and is usually due to a weakening of muscles supporting the bladder.

Some people may feel a sudden need to urinate and be unable to reach a toilet in time. This problem, called "urge" incontinence, is often associated with such maladies as multiple sclerosis, Parkinson's disease, and stroke but can also affect otherwise normal elderly individuals.

A leakage of small amounts of urine may indicate a filled bladder that cannot empty. In men, an enlarged prostate gland can block urination, leading to "overflow" incontinence. Diabetes can also disrupt normal contraction of the bladder.

In addition, there is "reflex" incontinence. This is a condition in which a person may have a full bladder but be unaware of the need to urinate because the brain, for some reason, has not received the proper signal. As a result, urination occurs involuntarily.

The MGH Urology Service has a battery of tests to evaluate voiding disorders and to help formulate a treatment plan.

Dr. Barry N. Nocks, who codirects the service's Urodynamics Laboratory with Dr. Barbara Bassil, said patients are first asked for a medical history which might provide clues to the origin of their difficulty. Medications being taken for other conditions, for example, sometimes affect bladder function.

Patients then undergo a brief urologic examination. Women are checked for a possible prolapsed or "dropped" bladder resulting from weakened muscles, and men are examined to determine if the prostate gland has enlarged with probable increased pressure on the urethra, the tube that carries urine out of the body.

"We have a variety of drugs with which to treat urinary disorders," said Dr. Nocks, who is also Director of Urology at the MGH-affiliated Spaulding Rehabilitation Hospital in Boston. "Despite adverse side effects, drugs have provided long-term relief from urinary incontinence for many patients."

Some medications control hyperirritable bladders which contract frequently and thus cannot store very well. Other drugs act on weak, or hypotonic, bladders which could be the result of diabetes or a prolonged obstruction. Medications also work at the bladder neck to either relax that area and promote emptying or to strengthen the bladder neck and urethra to create continence.

A number of behavioral management techniques, including biofeedback, have helped individuals to sense developing fullness in the bladder and given them time to reach the bathroom.

If drugs and other measures to control urination fail, surgical remedies can be considered. In the past, women suffering stress incontinence resulting from a prolapsed bladder have undergone an abdominal operation for reinforcement of the bladder's muscle supports.

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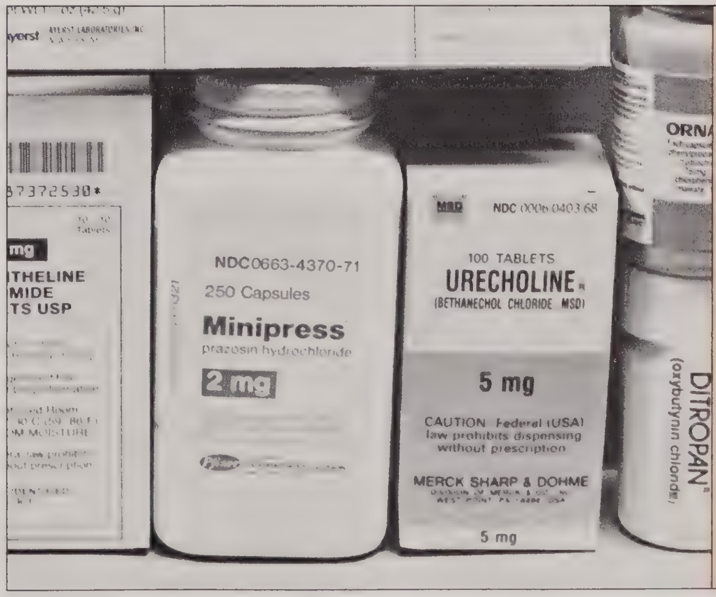

Although many people believe that urinary incontinence is a normal part of aging, a variety of medications have demonstrated an ability to counteract the condition.

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— *Many Conditions Can Produce Incontinence*

(Concluded from Page 7)

Today, many urologists forego a major incision in the abdominal wall and instead use transvaginal techniques, at least initially, to strengthen bladder support.

In men, not only can an enlarged prostate inhibit urination but in some individuals surgery on the prostate has produced incontinence by the inadvertent cutting of a muscle valve (sphincter) through which urine flow is normally controlled.

However, in recent years an effective artificial sphincter has been developed correcting this problem. Resembling a cuff, the device is implanted internally around the urethra and can be contracted or released at will by the patient.

The MGH also recently began treating enlarged prostates with a nonsurgical technique, using heat to shrink the tissue. Developed in Israel, the treatment, currently conducted on an investigational basis, involves introduction of a microwave unit through the rectum to raise prostate temperatures to a level incompatible with cell life (*MGH News*, October 1988).

As a stopgap measure to deal with urinary incontinence, Dr. Nocks often recommends intermittent catheterization, a nonsurgical technique that patients can conduct themselves.

Dr. Nocks recalled that when he was a medical resident in the 1960s he encountered a gentleman who had trouble urinating because of an enlarged prostate closing down on his urethra.

“He absolutely refused to have a prostatectomy (surgical removal of the prostate or a part of it),” Dr. Nocks said. “Instead, he carried a catheter (a section of tubing) in his hat and whenever he had to urinate, he simply took the catheter, passed it up his urethra, getting by the prostate, and emptied his bladder through the tube.”

The MGH urologist, who is also Assistant Professor of Surgery at Harvard Medical School, said that most men who can benefit from a prostatectomy have the operation, but that intermittent catheterization is particularly suitable for men and women who find that drugs are ineffective or cause unacceptable side effects and that other measures simply do not work.

“Some of the patients I discuss this technique with insist, ‘Oh, I can’t do this,’” he said, “but I teach them and they often do very well.

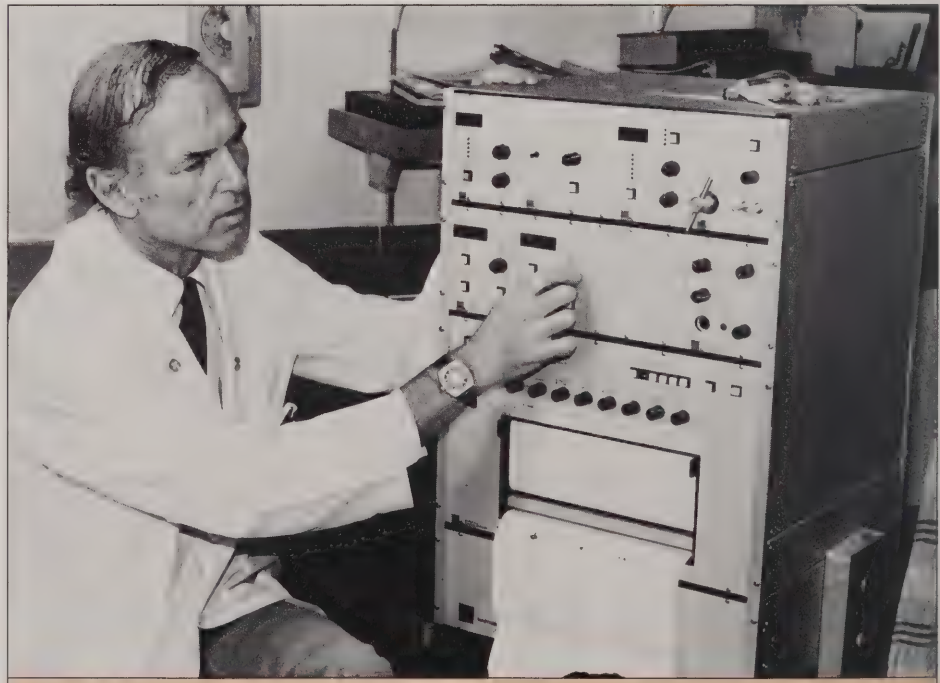
“Patients catheterize themselves often enough to keep bladder volumes reasonable. Every six or eight hours would be a suitable time frame. If a patient has to catheterize himself every two hours, that is too often, and another mode of treatment should be sought.”

Dr. Nocks added that sterilizing the catheter is not important because even if bacteria enter the bladder, emptying it prevents any infection from developing.

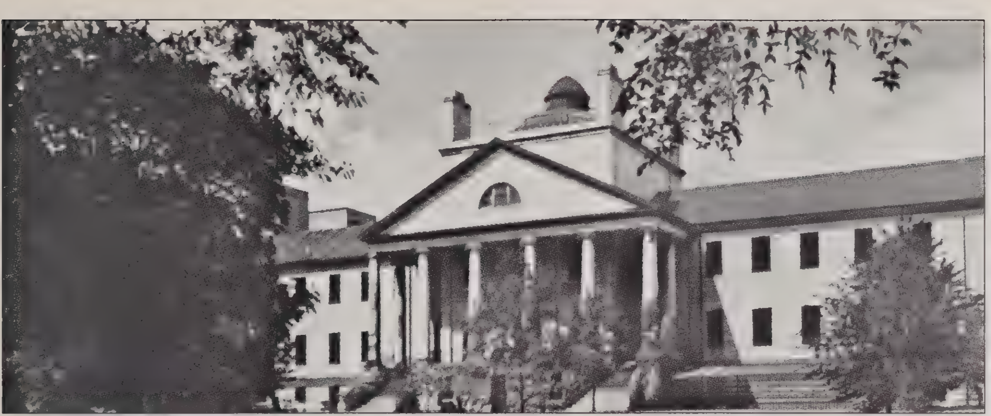
Working at Spaulding Rehabilitation Hospital with Elizabeth Montgomery, RN, Dr. Nocks has seen many men and women patients overcome incontinence through self-catheterization and leave the hospital much happier.

“We try to get rid of permanent, indwelling catheters that carry urine to bags worn on the body and sometimes lead to infection,” he said. “Patients feel much better about themselves and have a much improved body image when they can discontinue using an indwelling catheter.

“We have found that with intermittent catheterization we can bring people along in a safe way and in time, with regular emptying, their bladders might even regain much of their former normal functioning.” ■



In the MGH Urodynamics Laboratory, Dr. Barry Nocks prepares a machine for use in assessing a patient's bladder function.



MGH *News*

Massachusetts General Hospital, Boston, Massachusetts

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Some Types of Cancer Spread in Predictable Ways

WITH FEW EXCEPTIONS, cancer kills after first spreading from its original site to ravage other parts of the body.

This has prompted researchers to investigate whether cancerous cells disseminate randomly or actually follow a predestined course.

Evidence has already been gathered that patterns of spread (metastasis) by at least some cancers are predictable. Thus, new avenues of study have opened in the battle to conquer the nation's deadliest affliction after heart disease.

One of the leading questions being probed is whether something special exists in the makeup of a particular organ that invites certain cancerous cells to settle there and thrive.

Since 1981, Dr. Suzanne de la Monte of the MGH Cancer Center has analyzed hundreds of autopsy records, first at Johns Hopkins Hospital in Baltimore and later at the MGH, to try to resolve the dilemma over how cancer spreads.

From her work with these records, which date to 1970, the MGH neuropathologist became one of the first investigators to find that certain cancers do metastasize in predictable fashion. Additionally, she and two colleagues from Johns Hopkins found that the impact on various parts of the body by at least one type of tumor, breast cancer, is also often influenced by a patient's age.

Writing in the scientific journal *Human Pathology*, Dr. de la Monte and her co-researchers, Drs. Grover M. Hutchins and G. William Moore, reported findings from autopsies on 187 patients who had metastatic breast cancer.

Dr. de la Monte, the principal author,

(Continued on Page 2)

INSIDE:

Page 6 - Another uphill battle to overcome measles

Page 7 - Amassing the energy needed to compete

Ever on Guard Against Abnormal Apnea

A DECADE AGO, an estimated 10,000 babies died each year from what was vaguely referred to as Sudden Infant Death Syndrome (SIDS).

Seemingly healthy, they succumbed in their cribs without any sound, gasps for breath, or struggle. Autopsies failed to offer any clues to the cause of death.

Today, SIDS is still cloaked in mystery. No one even knows whether its causes are few or many.

Nevertheless, the death toll from SIDS has dropped appreciably, from 10,000 annually to an estimated 7,000.

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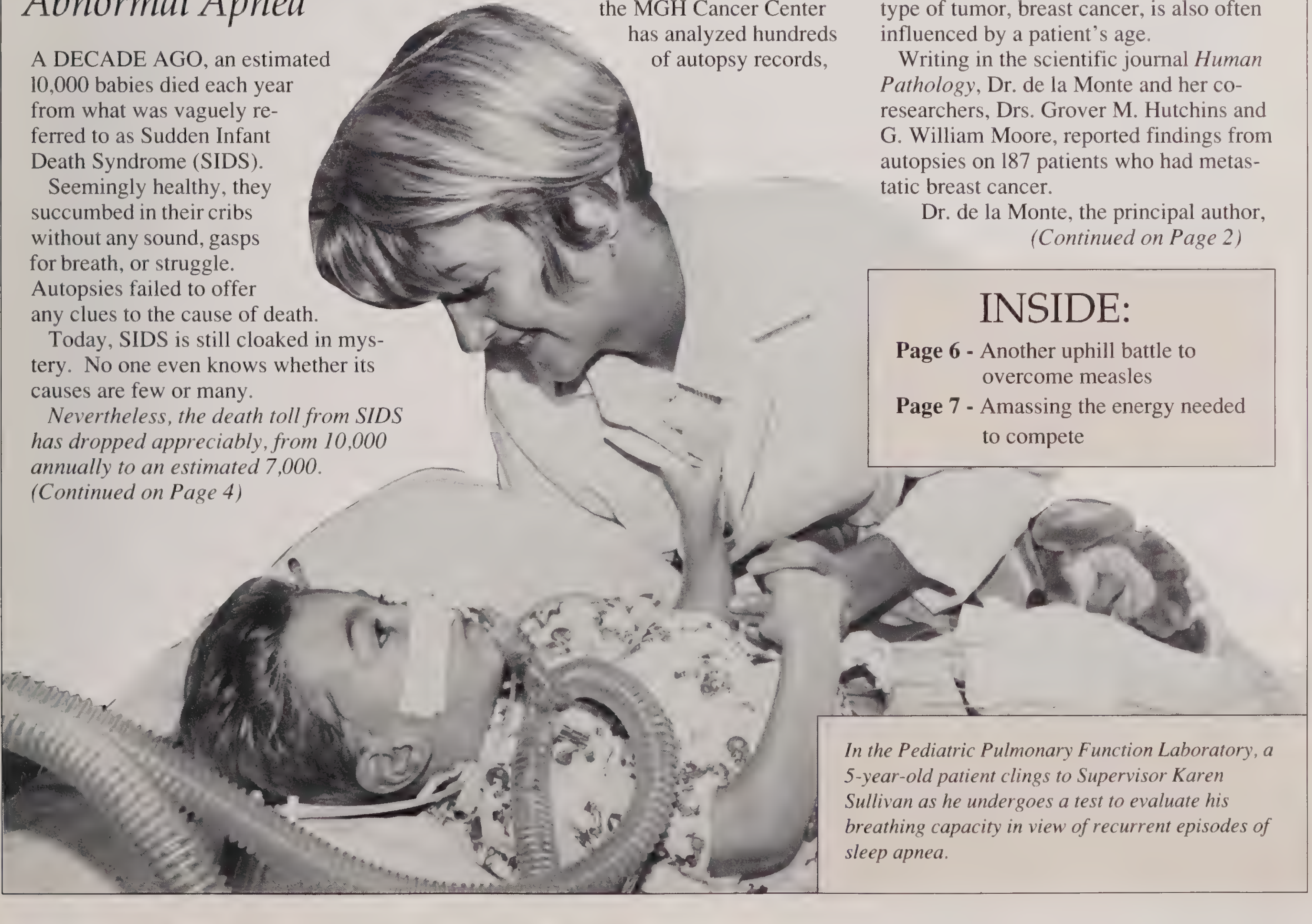

In the Pediatric Pulmonary Function Laboratory, a 5-year-old patient clings to Supervisor Karen Sullivan as he undergoes a test to evaluate his breathing capacity in view of recurrent episodes of sleep apnea.

EDITORIAL:
A Recurring Theme

HOSPITAL COSTS are a recurring theme these years. It is difficult to avoid the subject when talking or writing about hospitals. No wonder. A few day's stay in even a community hospital can slice a hole in many a family budgetary pocket. So can sending a teen-ager to college. Or try comparing food costs today—even for one piece of fruit—with those of a few years ago.

The fact is that for most Americans the cost of living (even with only moderate inflation) is staggering. As for medical bills, hospitals are not out to gouge patients—regardless of what a number of people may think. Most hospitals we know are struggling to offer the best care they can for the least amount of money. However, to pay the bills (and stay open) requires significant charges. Hospitals are failing or merging because they are unable to pay vendors of expensive technologies and other supplies and meet the payroll of a work force that alone accounts for roughly from three-fifths to two-thirds of all hospital costs.

Acute care institutions can not do much about the payroll. Their employees tend to be highly skilled, superbly trained, and able to command top dollar. Only a few years ago nurses received a salary well below their professional value. In hospitals like the MGH they now receive significant wages for a 40-hour week. The law of supply and demand has also enabled therapists and technicians to get increases. And business leaders know what good secretaries are currently worth.

High technology equipment is by itself expensive. In the case of teaching hospitals, high technology is what the patients demand. Many patients come to the MGH because they know the reputation of its care takers and that the hospital has pioneered high tech. A few examples from the 1980s: artificial skin for burn care, laser treatment for kidney stones and birthmarks, landmark discoveries about a handful of genetic diseases, and development of a new field of medicine called photochemotherapy. In addition the MGH is often among the first two or three hospitals in the nation to introduce new major treatment or diagnostic advances like kidney stone lithotripsy, CT scanning, and MRI.

The above is really a much oversimplified look at the complexities which cause hospital costs to soar. Even inflation in seemingly unrelated portions of the economy causes problems for hospitals. The price of food is one example. Each day the MGH feeds 10,000 employees from one to three meals. Nearly 1,000 patients receive three meals a day, and several thousand visitors daily eat at the hospital.

Then add federal and state cost controls that result in hospitals employing innumerable employees merely to fill out governmental forms. In some states, New York and Massachusetts the most difficult, fiscal constraints force hospitals to accept millions of dollars less than it costs to care for the very patients the governments are responsible for (Medicare and Medicaid) and even impact the amount that can be received from nongovernmentally supported patients. Add sicker, older patients, AIDS patients, and drug addicts and stir gently. What you have are two world renowned New York hospitals each running about $40 million per year in debt. Massachusetts is not all that far behind. Unless governments reassess their manner of constraints, an increasingly dismal patient care future lies ahead.

Spread of Cancer

(Continued from Page 1)

wrote that as age increased a progressive decline was noted among the patients in the frequency of metastases to specific sites in the body.

Patients ranging in age from 47 to more than 60 had a significantly less frequent spread of cancer to the central nervous system, endocrine organs, ovaries, pancreas, and gastrointestinal tract than patients less than 47.

In the advanced age group, Dr. de la Monte said in an interview, breast cancer not only spread much less often but when it did it also generally restricted itself to a very few sites, such as the bone, liver, or lymph nodes, and stayed fairly regional.

The duration of survival was not correlated with age at the time that the breast cancers were discovered.

The MGH and Johns Hopkins investigators suggested in their journal article that the age-related differences in the biologic behavior of breast cancer may result from the fact that as one becomes older the body's metabolic, endocrine, and immunologic functions all decline dramatically.

This is important, Dr. de la Monte said, because when a tumor spreads it hunts for an environment suited to its needs.

When advancing age, for example, reduces hormonal production, thereby altering one's metabolic rate, less energy is available to nourish a tumor. Cells from a malignant lesion might try to settle in a particular area of the body, but lacking a supportive environment they would die.

Even before cancerous cells land on a new "home" site, they must overcome incredible barriers in metastasizing.

"They have to break through their normal barrier to get into the circulation," said Dr. de la Monte, who is also Assistant

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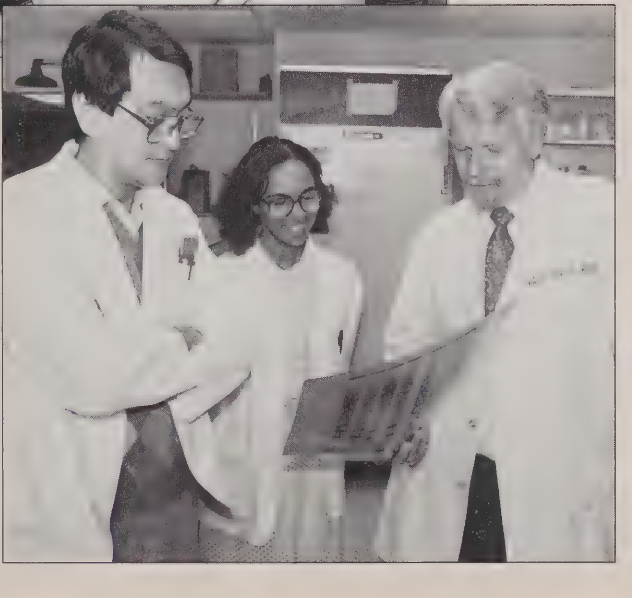
Professor of Pathology at Harvard Medical School. "Then, they must survive turbulent blood flow with all the pressures that exist to reach their new home. After that, there is still the task of invading the home."

In her studies, the MGH scientist often encountered little areas of tissue break-in and death (necrosis) but no sign of tumor.

"That kind of situation frequently occurs in the brain," she said. "We say the patients had 'little strokes.' Actually, tumorous cells probably landed in a certain area of the brain, didn't find it a pleasant place to stay, and so just died."

Top: Dr. Suzanne de la Monte at work in the MGH Cancer Center



Right: *Dr. Hiroshi Takahashi, a visiting scientist from Tokyo; Dr. de la Monte, and Dr. Jack Wands, Chief of the Molecular Hepatology Laboratory, discuss radiologic films showing DNA from cancer cells.*

Metastasis of a cancer that originated in the brain is rare. What happens is that the cancer just expands, getting bigger and bigger, and progressively infiltrates surrounding tissue. Why it behaves that way is unknown.

"A brain tumor usually stays within the nervous system," Dr. de la Monte added, "because outside this system it would have little chance for survival."

A cancer arising in the lungs can also kill without metastasizing. It may simply grow into a huge mass, encase the airways (the bronchial tree), and exert such constrictive pressure upon the airways that the patient can no longer breathe.

Studies of the deadliest skin cancers, melanomas, showed that when it came to metastasizing they fall into two distinct groups.

One group clearly indicated a preference for new homes in the central nervous system. And they always seemed to go to the same spot, the cortical gray matter containing all the nerve cells, never to the white matter or spinal cord.

Other melanomas would almost never go to the brain but would display a preference for several other areas, including the bone marrow and spleen.

Dr. de la Monte's studies showed that the wider-ranging movement of this second group of melanomas could be traced to the nature of the target tissue as it existed in the embryo.

All of the structures attracting these tumors were derived from a type of embryonic cells called mesoderm, which give rise to muscle, bone, blood, and fat.

"We know that during embryonic development similar tissues 'hang out' together," said Dr. de la Monte. "And once they have developed they maintain a certain relationship to one another."

Tissues making up the liver and the lungs are clearly derived from an embryonic class of cells called endoderm. These cells also lead to development of the digestive system and the pancreas.

A third type of cells, making up the outer layer of the embryo, is referred to as ectoderm and helps to form nerve cells as well as outer skin or epithelial cells in the fetus.

"One can speculate," Dr. de la Monte said, "that by virtue of the kind of tissue in which it arose or grew, a tumor that metastasizes would prefer a site with a similar embryonic origin. At any rate, I don't think there is anything coincidental with respect to cancer metastasis. There has to be some reason for it."

In the search for ways to predict whether and how cancer will spread, much interest is currently being expressed in the role of genes, which carry the blueprints of heredity in the body's cells.

Early research indicates that certain alterations detected in genes can signal the occurrence of colon cancer or of another growth called small cell lung cancer.

Actual testing of patients' genes in this diagnostic manner is still some years off, but when that day arrives it may be possible to say from the test results that a high risk for cancer exists and that early treatment should be considered.

If cancer has already been detected, the genetic changes might indicate whether the growth is likely to remain at the primary site and therefore might be completely removable with surgery and radiation treatment. Or the genetic changes might be such that a spread of the cancer is probable and treatment additionally with powerful drugs is in order.

If someone has a strong family history of cancer, a study of that individual's genes might indicate the level of risk for also developing the disease.

Dr. de la Monte hails the genetic studies of cancer investigators as very promising, but she has this caution:

"In studying a tumor one must be absolutely sure that it is sampled broadly because every time the tumor divides it has the potential to create a new mutation. The muddiness we find in metastatic patterns typically arises from dissimilarities caused by the multiple divisions of the original tumor cell." ■

—Abnormal Apnea

(Continued from Page 1)

A concerted medical campaign to rescue children from abnormal sleep apnea, long regarded as one of the causes of SIDS, may deserve some of the credit for the decline in fatalities.

Apnea is a cessation of breathing. The condition occurs among many babies but usually lasts fewer than 15 seconds and inflicts no harm. However, when apnea becomes prolonged, is accompanied by a decrease in heart rate, or is marked by an obstruction in the airways that blocks air flow, the threat to life mounts.

> *The MGH Pediatric Pulmonary Unit has played a leading role in protecting babies from pathologic apnea through studies of more than 15,000 infants since 1974.*

The MGH Pediatric Pulmonary Unit, directed by Dr. Daniel C. Shannon, has played a leading role in protecting babies from pathologic apnea through studies of more than 15,000 infants since 1974.

The studies have made it possible to identify babies at risk for the potentially fatal condition, determine those who require monitoring, and furnish effective treatment.

Dr. Dorothy H. Kelly, Associate Director of the Pediatric Pulmonary Unit and pioneering head of its Home Monitoring Program (*MGH News*, January-February 1979), said that only about 1,600 (11 percent) of the 15,000 apneic infants were judged in need of home monitoring.

Among nonmonitored children, the death toll for infants whose parents complied with prescribed therapy was 0.3 per thousand. The toll rose to 1.3 per thousand among babies whose parents did not comply with treatment. Still, the figures were under the prevailing nationwide death rate for SIDS.

Dr. Kelly said that "since we learned the criteria that predict outcome in many infants, we haven't had one death among our monitored infants in the last five years."

In formulating the criteria, Dr. Kelly and her associates first compared information on children who had died with data on those who had survived. How were the children different? Did their tests vary? Were their gestational ages at birth or their birth weights of significance? Did gender figure in the malady?

The investigators found no differences in the physiologic characteristics of the children. The only difference came in the patient care outcome.

If a baby was brought to the hospital with sleep apnea requiring mouth-to-mouth resuscitation, later was sent home, and within two weeks had another apneic episode, that child was found to have a 28 percent risk of death.

If the same patient also experienced minor seizure activity, such as twitches, the chance of dying rose to 57 percent.

If the brother or sister of a SIDS victim had an episode of prolonged sleep apnea, that patient was found to have a 25 percent chance of dying.

And when a baby was born into a family with two previous SIDS victims, that infant had a mortality risk of 19 percent right from birth, even without recognized apneic events.

"We have been able to avoid deaths among these high-risk children," Dr. Kelly said, "by paying close attention to them, putting them on appropriate monitors, recording vital information, and tailoring specific treatments when necessary."

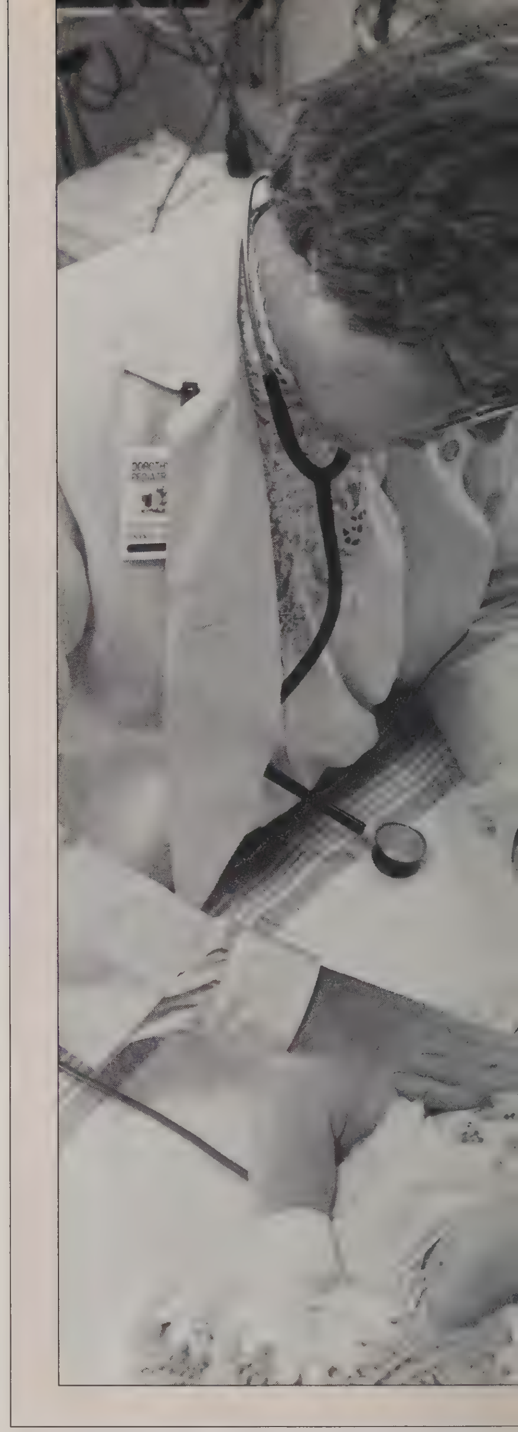
In the overall population of apneic infants evaluated by Dr. Kelly and her group, one third were found to have such minor apnea that no treatment was needed.

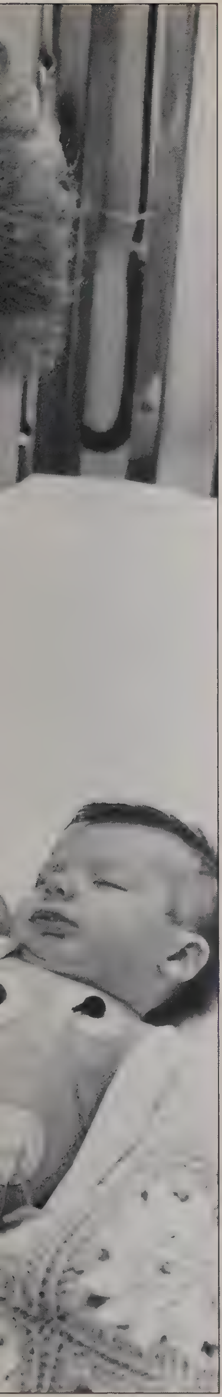
In another one third, the pediatricians discovered treatable causes. One of the most common was gastroesophageal reflux. "All babies spit up, but some spit up too much," said Dr. Kelly. "This can lead to breathing abnormalities."

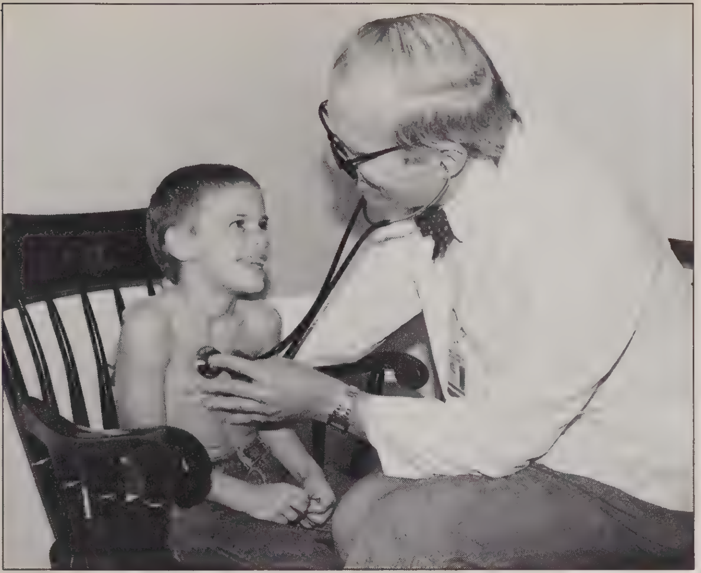
Some infants who experience increased periodic breathing develop apnea. Seizures can bring on apnea, and so can infectious diseases such as whooping cough (pertussis).

One fourth of infants with apnea respond well to the drug theophylline. Administered in liquid form, usually every four hours, the drug helps to stimulate respiration and eliminate apnea and a slowing of the heart rate (bradycardia).

Home monitors maintain a continuous check of a baby's respiration and heart rate and sound an alarm if either falls into a danger zone, signalling apnea and a need



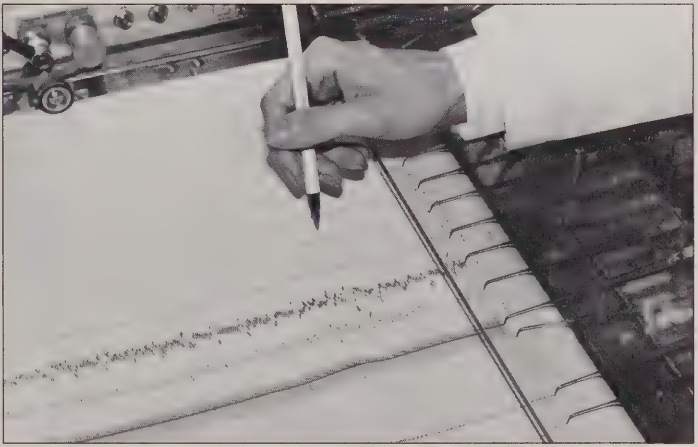




Above: *Six-year-old John Prudente of Dracut, MA, clearly enjoys his periodic visits with Dr. Daniel Shannon. Because of apnea, the first grader has been guarded during sleep by a home monitor since the age of 1. He has also worn a pacemaker since the age of 2 because of a slowing of his heart rate.*

Left: *Dr. Dorothy Kelly checks on a 5-week-old infant being protected by a monitor against a possible prolonged breathing stoppage during sleep.*

Below: *By assessing a variety of physiologic functions, a polysomnograph test helps physicians to tailor treatments for apneic patients.*



for stimulation. Because of such recordings (pneumograms) that showed bradycardia, two children had implantation of a protective pacemaker.

In the MGH's Pediatric Pulmonary Function Laboratory, a test (polysomnograph) is often conducted to check even more physiologic factors. These include electrical activity in both the brain and muscles, status of air flow, movement of the chest and abdomen, and levels of oxygen and carbon dioxide in the blood.

Usually after an infant has gone two months without any episode of apnea or slowing of the heart rate and has had two normal pneumograms, the home monitor can be withdrawn.

The criteria to discontinue monitoring of babies with a history of apnea or bradycardia requiring vigorous stimulation to resuscitate are somewhat more strict. In such babies under a year of age, the monitor can be withdrawn after three months of no episodes. In those older than 12 months, the waiting period is four to six months.

"We do continue to have a few children who need monitoring past one year," said Dr. Kelly, who is also Associate Professor of Pediatrics at Harvard Medical School. "The oldest child I've discontinued was 9 years old. His condition was such that at times he would develop bradycardia in school and slump down at his desk. A nurse had to be available to give him his medicine, sometimes during a class."

Ten years ago, perhaps 5,000 apneic babies across the country were monitored at home. Dr. Kelly's program had patient referrals from communities all along the east coast and as far west as Chicago. And medical specialists came from foreign countries to observe her pioneering unit.

"I don't believe there is a major American city today that doesn't offer at least one home monitoring program," said Dr. Shannon. "It is estimated that about 50,000 babies are now being monitored each year in the United States."

The monitors have also undergone major improvements. For one thing, they are now much better at tracking respiration. At one time, the machine's sensitivity for respiration was determined by where somebody set a button. If a baby was breathing at one depth and suddenly breathed a little less deeply, the alarm might go off.

Today's monitor can track all the way from very high breathing to very low breathing without setting off a false alarm.

In the past, some parents altered settings on monitors used in the homes. Not any more. The controls are now within those machines, accessible only to physicians and other authorized personnel.

And a change really welcomed by parents. Until a few years ago, parents were homebound by devices plugged into wall outlets. The monitors have become portable. Capable of operating on rechargeable batteries for up to 24 hours at a time, the devices can now be carried in shoulder bags to accompany a baby wherever a family wants to go.

The Pediatric Pulmonary Unit is currently engaged in a large scale physiologic study of babies up to one year of age to compare them with infants who have died from SIDS.

"We have no idea of the extent of apnea in SIDS and what the other causes of SIDS may be," Dr. Kelly said. "If through this new study we can identify better what abnormal physiology is often present prior to death due to SIDS, then using pneumograms we may be able to determine whether any of the seemingly normal infants may be at risk for SIDS.

"The small study we did earlier was on apnea babies only and from those results we really couldn't make recommendations to the whole population. That's really what we want to get at...a whole population ... to try to save more infants." ■

Another Uphill Battle To Overcome Measles

FROM 57,345 cases in 1977 to a low of 1,497 just six years later ... a 97 percent drop!

Health officials were so elated over the progress of a National Measles Elimination Program, launched in 1978, that they predicted measles in this country would soon be relegated to history.

But the hope of eradicating this highly contagious disease in only a few years has faded. Instead of continuing to decline after 1983, the incidence of measles veered up again. It reached 6,282 cases in 1986, and this year, after only eight months, the toll passed 10,000.

Spread person to person by large droplets from the nose and throat, measles reaches its peak during the late spring. It is most contagious from two days before to four days after the onset of a rash. The characteristic rash often appears first behind the ears, spreads across the face and neck, and then over the rest of the body.

The rash begins to fade after about four days. In the meantime the patient should be kept away from anyone not immune to the virus. With rest, fluids, and fever-reducing drugs, a smooth recovery can usually be expected, although a cough may persist for several days after other symptoms have disappeared.

The Centers for Disease Control in Atlanta reported that in just the first six months of this year there was a 392 percent increase of measles nationwide compared to the same period last year.

Two major types of outbreaks were occurring in the United States, one involving vaccinated school children and young adults, the other unvaccinated preschool-age youngsters.

More than 90 outbreaks erupted across the country in the first six months, most of them in high schools and colleges.

Despite vaccination levels exceeding 98 percent among the school-aged populations, failure of inoculations to "take" permitted a substantial number of measles transmissions. Such failures may occur in as many as 10 percent of vaccinees but not become known until a shot is put to the test years after it is administered.

One such challenge comes from people who bring the virus from other countries where controls are less strict. From January to the beginning of September, 441 cases of imported measles were reported to the Centers for Disease Control.

One of the largest measles outbreaks during the first half of the year occurred in Houston. The majority of more than 1,700 reported cases involved unvaccinated preschool children. *As of the beginning of September, Texas had recorded 2,991 measles cases since the first of the year compared to only five for the same time in 1988.*

Chicago has had a rough year. As of August 23rd, a total of 1,123 confirmed cases of measles had been reported to the city's Board of Health since January 1. Information available on 1,019 patients showed 799 were under age 5 and 340 of that group were too young for routine immunization. Blacks and Hispanics accounted for 94 percent of the 1,019.

In addition to ordering intensified surveillance, Chicago lowered the recommended age for measles vaccinations to 6 months from the customary 15 months with revaccination at 15 months. Seven new vaccination clinics were set up in the city, and special teams made door-to-door visits in high-risk neighborhoods to administer shots.

Reimmunization has become a major issue nationwide because of the general upsurge of measles. Both the Immunization Practices Advisory Committee of the U.S. Public Health Service and the American Academy of Pediatrics favor routine second shots, but they differ on the best time to give them.

"Generally speaking, the advisory committee recommends that the second dose be administered at the time of school entry while the academy suggests some time between the 7th and 9th grades," said Dr. Charles J. Homer, Chief of the Pediatric Unit at MGH-Revere Health Associates.

"The controversy still has not been resolved. The chief issue appears to be how to capture the largest percentage of the population.

"Almost all children see a physician before entering kindergarten because of a requirement that they have all of their immunizations. One can reliably expect upwards of 95 percent of the children for that visit. If one talks about later visits, however, compliance is less assured."

Dr. Mark S. Pasternack, who heads the Pediatric Infectious Disease Unit at the MGH, said that many prep school and university health departments are mandating revaccination against measles as a condition of student enrollment.

"The greatest concern about measles," he said, "used to focus on small children who might develop such complications as fever, pneumonia, or even encephalitis (inflammation of the brain), but now many outbreaks are among older children and students in university dormitories.

"Not only do pediatricians have to be concerned about this disease today, but so must specialists in adolescent medicine and general internists seeing young adults."

Measles has taken the lives of adolescents and college students as well as young children.

Most people born prior to 1957 are con-

At the MGH's Bunker Hill Health Center, Dr. Ralph Minear waits for just the right moment to inoculate 15-month-old Sarabeth Henderson of Charlestown.

sidered immune to measles. Those born between 1957 and 1967 may have received either one of two vaccines. Licensed in 1963, one was made from a killed virus, the other from a live attenuated virus.

The killed virus vaccine was discontinued in 1967 because people who received it and then were exposed to measles sometimes developed an atypical measles.

"This is actually a different disease than natural measles," said Dr. Pasternack. "It has a prominent rash unlike the usual measles rash, and there is an impressive frequency of lung involvement as well."

Revaccination using the live vaccine is recommended for everyone born after 1957 who has not already contracted measles, was not vaccinated with the live serum after one year of age, and cannot offer any laboratory evidence showing immunity.

When the live vaccine was introduced a quarter century ago, it made a tremendous impact on measles. Epidemics had occurred with regularity every two to three years. The vaccine put a stop to that and at the same time decreased the prevailing sickness and fatality tolls.

Dr. Pasternack described the live measles vaccine as both effective and safe. "The only shortfall," he said, "is that it does not guarantee universal immunity. There have always been some cases of imported measles. With a lack of total immunization in our country's population, one imported case can ultimately be responsible for infecting many Americans."

In Massachusetts, where in the first eight months of this year 45 measles cases were reported compared to only three last year, the state's Public Health Department has until now provided free vaccine to hospitals and clinics.

The Pediatric Group Practice in the Wang Ambulatory Care Center at the MGH and the Pediatric Units at the hospital's health centers in Charlestown, Chelsea, and Revere are participating in the statewide immunization effort.

Dr. Homer at Revere said the vaccine is usually given together with protection against mumps and rubella (German measles) when a child has a routine checkup at 15 months of age.

"We must have informed consent from a parent to administer the vaccine," Dr. Homer said. "But first we inquire whether there are reasons why the shot should not be given. Contraindications are carefully spelled out on the consent form.

"We've had many queries about when older children should get second shots. I think most of us are waiting for guidance from the state on this."

Under a severe fiscal crunch, the state's Public Health Department is not only concerned about the timing of a second shot but also where funds will come from to pay for the additional vaccine. ■

Amassing the Energy to Compete

TO ENCOURAGE sports competition in the People's Republic of China, the government in Beijing rewards outstanding athletes with financial bonuses.

The government feels that with the money the athletes can afford better nutrition and, in turn, that can enhance the likelihood of continued high performances.

But the strategy is backfiring. Following the age-old theory that what is costlier must be better, the star athletes have added much more meat and dairy products to their diet.

The result is often higher levels of cholesterol in the blood which, in turn, can set the stage for later development of atherosclerotic disease leading to possible heart attacks and stroke.

So intense is competition in sports that participants grope for whatever may give them the slightest edge in endurance. This has fueled dietary fads and misconceptions.

As far back as 450 B.C., athletes in Greece were led to believe that eating muscle meat led to muscle strength. Training tables laden with steaks became the rule and still are in evidence today in many team camps.

Steaks are loaded with protein and fat. Both can supply the body with energy, but it is complex carbohydrates, such as found in bread, pasta, potatoes, grains, and rice, which essentially give the body its needed levels of a sugary substance called glycogen from which muscles derive their stamina.

Two MGH and Harvard specialists in preventive medicine have cautioned against manipulating the diet on the basis of fads and mistaken beliefs and have emphasized in particular that dietary supplements contribute nothing toward optimizing one's athletic performance.

Dr. Alexander Leaf, Director of the MGH-Harvard Cardiovascular Health Center and Chairman of the Department of Preventive Medicine at Harvard Medical School, and a staff nutritionist for both, Karen B. Frisa, MS, RD, coauthored an article entitled *Eating for health or for athletic performance* which appeared in the *American Journal of Clinical Nutrition.*

"Good general nutrition," they wrote, "seems to be adequate and probably optimal for athletic performance when quantities of food are sufficient to satisfy the increased caloric needs of athletes during training and competition. At least there is no evidence that supplementing a balanced, calorically sufficient diet with protein, vitamins, or minerals contributes to nutritional status or athletic performance."

Dr. Leaf and Ms. Frisa outlined the makeup of a healthy diet:

"We would regard as balanced a diet in which 12-15 percent of calories come from protein, 20-30 percent from fat, and the remaining 55-65 percent from carbohydrates with food selections representing all four of the accepted food groups: cereals; meats, poultry, or fish; vegetables and fruits; and milk.

"These foods consumed routinely in sufficient quantities to meet energy requirements will ensure that all essential nutrients are obtained."

Several surveys of American athletes and coaches regarding knowledge of nutrition indicated they had much to learn.

In one survey of 96 high school coaches in Texas, 86 percent indicated they dispense nutritional advice at least monthly, but on a questionnaire on how much they know, they scored a poor 55 percent.

From randomly selected high schools in Connecticut, 943 athletes were quizzed on their nutrition knowledge, gained from their parents or coaches. These athletes also had a mean correct score of 55 percent.

Protein has many vital roles in the body, but building energy is not a leading one. Protein is necessary for growth and aids in the repair of injured tissue as well as in recovery from illness. Enzymes, which promote chemical reactions that enable the body to function, are made of protein.

Protein forms the antibodies in blood that fight disease and infection and also comprises part of the hemoglobin in red cells which transports oxygen through the bloodstream.

The body, however, does not store extra

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Complex Carbohydrates Enhance Energy

(Concluded from Page 7)

protein, such as for building strength for a major test of endurance.

"When extra protein is present," said Dr. Leaf, "the body converts some of the excess to sugar and the rest to fat. There is some evidence that excess protein can lead to a deterioration of kidney function. When we eat protein, we increase pressure on the glomerulus (the kidney's filtering apparatus) and over time that can cause sclerosis (scarring) of the glomerulus."

As for fat, while it carries vitamins A, D, E, and K and is a necessary component of cells, it is also a cause of obesity and disease, principally atherosclerosis. Thus, excess fat in the diet must be avoided.

In discussing carbohydrates as a principal source of energy, Ms. Frisa stressed the importance of complex carbohydrates, the kind found in fruits, vegetables, and whole grain products. These foods contain many essential nutrients in addition to calories. Simple carbohydrates, found in various refined sugars, provide calories but little in the way of nutrients.

"Foods high in sugar lead to high peaks of sugar in the blood, inviting a conversion to fat," Ms. Frisa said. "In contrast, sugar from complex carbohydrates is released gradually into the bloodstream, allowing muscle to replenish the glycogen it needs."

In training for a high-endurance event, many athletes engage in "carbohydrate loading," the consumption of huge amounts of carbohydrates, typically from starchy foods such as pasta. This can double the amount of stored glycogen.

Some athletes go to an even greater dietary extreme. They deplete the body of carbohydrates by exercising to exhaustion and then suddenly load up on carbohydrates for a few days before the big race. This results in an even greater accumulation of the glycogen stored in muscles.

Dr. Leaf describes the depletion technique as unnecessary. He said one can accumulate the amount of energy reserve needed by simply starting to load up with carbohydrates well before an event.

Athletes often consume a lot of sodium, or salt, to make up for what they think are heavy losses of sodium resulting from high expenditures of energy. Except in extreme conditions, excess sodium consumption is unnecessary.

"Actually, if there is a need to conserve sodium," Dr. Leaf said, "the body is so remarkable it can stimulate a hormonal action to reduce sodium excretion in urine almost to zero. At the same time, sodium losses in sweat will decrease greatly."

Continued loss of sodium, despite the body's compensation measures, can lead to dizziness, imbalance, loss of strength, and a drop in blood pressure. These symptoms add up to heat exhaustion.

Similar symptoms can follow a loss of too much water. A depletion of body fluids, including blood volume, prevents muscles from performing well and the body just becomes weaker and weaker.

In their journal article, Dr. Leaf and Ms. Frisa wrote about how some wrestlers employ unorthodox ways to lose large amounts of body water in order to qualify for competition in lower weight classes.

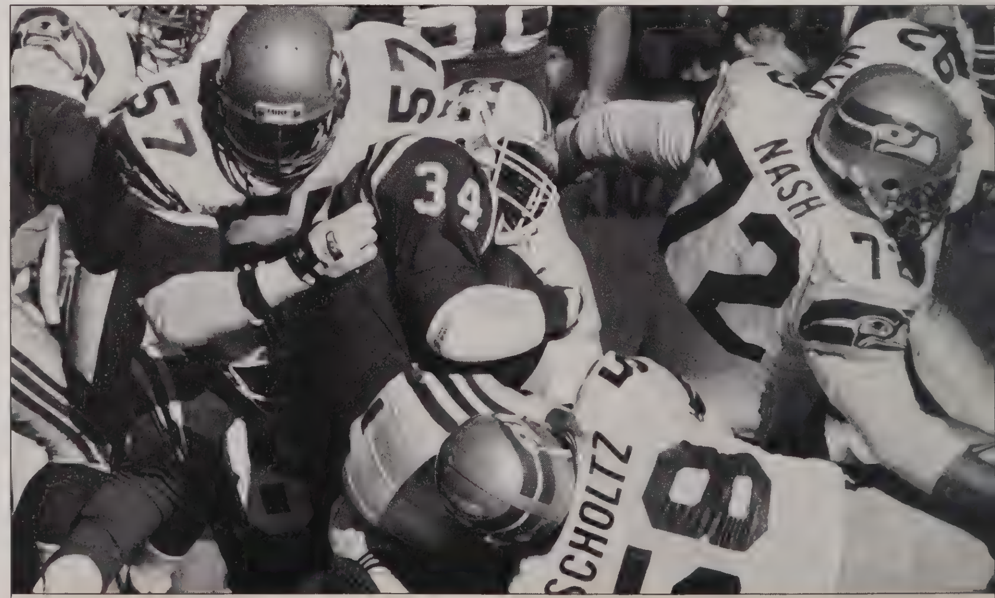
Their methods include diuretics, laxatives, forceable vomiting, sucking on lemons to force salivation and spitting, wearing plastic suits while sitting in steam rooms or while running or jumping rope to induce sweating, and taking alternately hot-and-cold showers to induce urination.

"Needless to say their belief that such weight loss makes them stronger is highly suspect," the authors commented.

Dr. Leaf warned that as athletes grow older and give up vigorous competitive sports they should not overlook the continued importance of a proper diet.

"It's hard for people to change the heavy eating habits they followed when they were active," said Dr. Leaf, who is also Ridley Watts Professor of Preventive Medicine at Harvard Medical School. "We often see former players becoming obese, possibly developing hypertension, diabetes, and coronary heart disease.

"When their days of high competition are over, athletes must adjust their dietary intake. At the same time, they should maintain some level of physical activity to keep their muscles and circulatory system functioning well." ■



The intense physical contact shown in this New England Patriots-Seattle Seahawks professional football game demonstrates the players' need for lots of reserve muscular energy that only a high carbohydrate diet can supply.

MGH News

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Blackouts May Be a Principal Cause of Drownings

SOME 6,500 AMERICANS die each year in drowning accidents, and panic while swimming underwater is frequently labelled as a principal cause.

An MGH research team challenges this notion, however, after spending August in the Far East studying the underwater endurance of champion human divers. They hold their breath underwater, unlike scuba divers who rely on air tanks.

Dr. Warren M. Zapol, who led the MGH group, commented:

"We do not think that drowning often stems from panic but rather from low oxygen pressure in the blood resulting from exercise underwater while holding one's breath."

During breath-holding at the bottom of a swimming area, whether it be a river, ocean, or pool, water pressure on the chest raises oxygen levels in the lungs. But during ascent, often vigorously swimming to the water's surface, the pressure on the chest reduces and oxygen levels in the blood fall, sometimes precipitously.

"This condition, called hypoxia, can lead to blackouts which are the probable cause of many drownings," said Dr. Zapol. "Even after a swimmer reaches the surface, the first few seconds cannot be considered safe because blackouts can still occur."

An MGH anesthetist and Professor of Anaesthesia at Harvard Medical School, Dr. Zapol led five expeditions to the Antarctic between 1974 and 1986 and gained a wealth of knowledge about the extraordinary underwater abilities of the Weddell seal (*MGH News*, March 1977).

In the coldest and most desolate region on earth, the Weddell seal plunges as deep as 1,500 feet to catch fish and may not surface for over an hour.

The extensive study of these seals led

(Continued on Page 7)

Below: *South Korean women divers have long been acclaimed for their breath-holding underwater feats.*

Whiplash Deserves Serious Attention

FEW CONDITIONS in medicine are as doubted, maligned, challenged, or scorned as whiplash.

Each year, more than half a million people in this country claim trauma to the neck as a result of a motor vehicle slamming into the rear of another.

Each occupant of the first car is catapulted forward by the impact so forceably that the head snaps backward, causing the neck to stretch beyond its normal range (hyperextension). The ensuing recoil (flexion) is limited. The forward movement of the head must stop when the chin strikes the chest.

An accident victim may not claim injury at the scene but after several days may unexpectedly complain of severe discomfort. The delayed reaction sometimes leads insurance investigators to question the validity of whiplash injury claims.

A stepped-up flow of adrenalin generated by the collision excitement or endorphins, the body's own pain killers, could have masked the pain initially. If the injured person had consumed a few drinks, the alcohol could have produced the same temporary pain-suppressing effect.

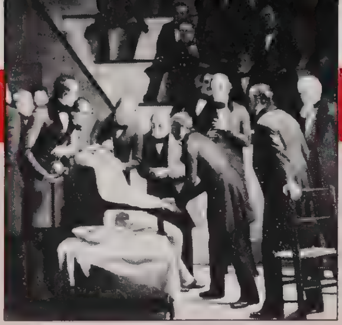
(Continued on Page 2)

INSIDE:

Page 4—Six MGH nurses honored nationally.

Page 6—Devising a pesticide harmless to humans

EDITORIAL



Why Does MGH Study Insecticides?

WHY ON EARTH is a teaching hospital neurologist trying to develop an insecticide? With the growing population of third world countries, increased food crops can mean the difference between well-nourished nations and famine. By itself adequate supplies of food for the poor will not erase pestilence. Good nutrition, though, can make a population more resistant to disease.

A page 6 article describes how the MGH investigator is using a hormone first discovered in an octopus in his search for the improved insecticide. Why an octopus? It turns out that the hormone has the property most desired. It can be made toxic to insects while posing little threat to humans. Unless used with caution, insecticides have been shown to harm the very humans that depend on them. As the article points out, it was a liquid chemical which became a poisonous gas that in 1984 killed and maimed so many residents of Bhopal, India, by attacking their nervous systems. If the research ultimately proves a success, the resultant insecticide could not only improve food production but also save humans from accidentally perishing from insecticides meant to wipe out crop-raiding insects.

On page 1 of this issue is the story of MGH scientists studying hardy women who even in the coldest weather dive without air tanks to harvest food on the ocean bottom. The goal is to learn secrets which may one day translate to ways of reducing the risk of drowning for less athletic people.

Within the MGH, Emergency Department professionals treat people for gunshot wounds, stabbings, life-threatening burns, and the full range of injuries the body human is heir to. Another front page article describes one type of injury commonly seen there—whiplash. And a page 4 article tells how six MGH nurses finished among the top 14 nurse finalists in the entire country in competition to find nursing excellence.

Month after month this publication tells of similar patient care, research, and teaching that stagger the imagination. It does seem remarkable that so many dedicated, bright, skilled, and imaginative people call the Massachusetts General Hospital home. Maybe that's why the MGH has so often been judged by "experts" to be the country's best hospital.

Whiplash

(Continued from Page 1)

Dr. Alasdair K. Conn, Chief of Emergency Services at the MGH, said that some fakery undoubtedly does occur.

"We hear of people being disabled for many months," he said, "and we sometimes wonder how justified that is. But just because a person doesn't get better as quickly as other people do from the same type of injury doesn't mean that the victim is faking."

Some accident investigators tend to compare the extent of injuries claimed with the degree of damage sustained by the vehicles in the accident, but there is really no correlation.

Whiplash fakery is not encountered very often in the MGH Emergency Department because patients with such complaints usually arrive very soon after an accident for examination and care.

The injuries run the gamut from minor sprains of muscles and ligaments to crippling nerve damage and fractures of the cervical spine, which is comprised of the top seven vertebrae of the spinal column.

Because of the possibility of serious neck injury, one of the first acts that paramedics and emergency medical technicians perform at a crash scene is to place a restrictive collar around the victim's neck. Only after the neck has been immobilized can the patient be safely transported to a hospital.

"The major concern is that if bones in the spinal column have been damaged, there might be sufficient mobility to cause compression of the spinal cord," said Dr. Daryl R. Gress, an MGH neurologist and Attending Physician in its Emergency Department.

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PHOTOGRAPHS: Pages 1, 8, courtesy of Dr. Warren Zapol; pages 3, 4 (upper), 6, Myron Daniels; page 7, courtesy of Dr. William Hurford; pages 4 (lower), 5 courtesy of Barbara Carter, RN.

"Such compression could have catastrophic consequences since all of the nerves going to the arms and legs pass through the spinal cord."

Before anything else is done, every whiplash patient routinely undergoes a brief neurological examination on arrival in the Emergency Department.

"We evaluate the patient's arms and legs in terms of their muscle strength and also check their sensation throughout," Dr. Gress said. "The patient then proceeds to have neck X rays taken to check for any bone injuries, particularly any breaks that might endanger the cord."

The first X ray is taken with the patient still wearing the protective neck collar. If the film shows no breaks, the collar will be removed, and five more X rays will follow. In addition to views of the patient's neck from the front, back, and two sides, a picture is obtained through the patient's open mouth to reveal the very top of the cervical spine.

Although X ray's principal value is in the analyzing of bone, Dr. Conn said the radiologic procedure can reveal subtle signs of other abnormalities.

"Normally there is a nice curvature to the bones making up the cervical spine," he said. "A disturbance of this curvature can indicate to the radiologist that there is spasm in the neck muscles.

"A torn ligament from hyperextension of the neck can also be picked up on X ray because where there is a tear there is bleeding and a big bruise. That will distort some of the soft tissue shadows normally seen on the film. The bruise will appear on the X ray as a big bulge."

If the patient has a massive physical build or is an older individual with some arthritis in the cervical spine, plain X rays may prove inadequate for a diagnosis. The attending physician may then order a CT (computerized tomography) scan to get better detail of the bone.

A patient's X-ray films may appear normal, yet the person may exhibit signs of a neurological deficiency. In this situation, MRI (magnetic resonance imaging) may be in order.

"MRI can give us much better pictures of a soft tissue injury," said Dr. Conn. "If there are indications for an emergency MRI, we will call in technicians in the middle of the night, if need be."

Sometimes the strain upon and stretching of a ligament will fail to tear it but will yank it from the neck bone to which it is attached. In the disengagement, the ligament may take a portion of the bone with it.

Occasionally, nerves will be injured at the points where they enter and exit from the spinal cord. Dr. Gress said a patient's complaint of a tingling, weakness, or numbness in the arms could signal this condition.

"Stretching of the nerve roots sufficient to cause symptoms in the arms is not very common," he said. "Also, the majority of such patients turn out not to have damaged the nerve roots as much as irritated them. The tingling, weakness, or numbness usually is resolved within days or a few weeks."

It is possible for whiplash injuries to include a brain concussion even though the head did not strike a solid object, like a windshield. Although the brain floats in spinal fluid, the speed at which the head is thrown in a rear-end collision may cause the brain to slosh up against the inner wall of the skull.

Dr. Gress said that such a concussion can cause dizziness, headaches, distorted vision, nausea, and pain in the upper part of the body, but the condition usually resolves itself.

On the whole, whiplash patients are treated on an ambulatory basis. They feel much better within a few days and by the end of a week are back to work. But they are advised to exercise caution in resuming daily activities.

To avoid hyperextension of the neck and renewed muscle strain which might cause pain to recur, they are often urged to continue wearing their restrictive neck collar for a while longer. Some physicians suggest wearing the device all night and periodically for a couple of hours at a time during the day.

As the acute phase of nerve and muscle irritation and swelling subsides, a patient may find that analgesics, muscle relaxants, and nonsteroidal, anti-inflammatory drugs can further reduce discomfort. Narcotic medications are not commonly prescribed.

Physical therapy may be recommended. Heat and ultrasound treatments can help to relieve muscle spasm. Gentle exercises also can strengthen muscles in the neck and improve range of motion.

Dr. Conn said that "if there is one message we can put out, it is for motorists to readjust the head rests in their vehicles."

In many cars today, he explained, the head rest is positioned too low. When the head whips backward in an accident, it is often the neck that hits the rest. Instead of being protective, the device acts as a fulcrum, causing further hyperextension of the neck and increasing the chances of serious injury.

"Head rests are not intended to cushion the neck in a collision," Dr. Conn emphasized. "They're supposed to come in contact with the back of the skull. In that way, they can guard the neck against injuries that might lead to life-long disabilities." ■

Injured in a cement truck accident, Lewis Stockwell of North Reading, MA, wears a special collar to immobilize his neck as Dr. Jose Vega and Nancy Pierce, RN, evaluate his condition in a trauma room of the MGH Emergency Department.

Six MGH Nurses Honored Nationally

NICK was quite a complicated patient ... difficult and demanding. He pressed the call button constantly, and it seemed like every day he was threatening to run away.

At times he threw bed pans, trays, and water pitchers. Many nurses on Bigelow 6 found it difficult to care for him.

Bethany Accomando, RN, was one notable exception on the general medical floor in the Gray Building's Bigelow Tower. She felt drawn to Nick, who was suffering from AIDS. And ultimately, she was to understand his behavior.

"Even though I realize the work might drain me physically and emotionally," she said, "I prefer to care for difficult patients because they usually need so much. Caring is an important part of what nurses do."

On November 2nd, Bethany spoke in Chicago at the First National American Journal of Nursing Conference on Medical-Surgical and Geriatric Nursing. As delegates listened, she read a letter she had submitted recounting how she and other nurses on her floor had banded together to help Nick.

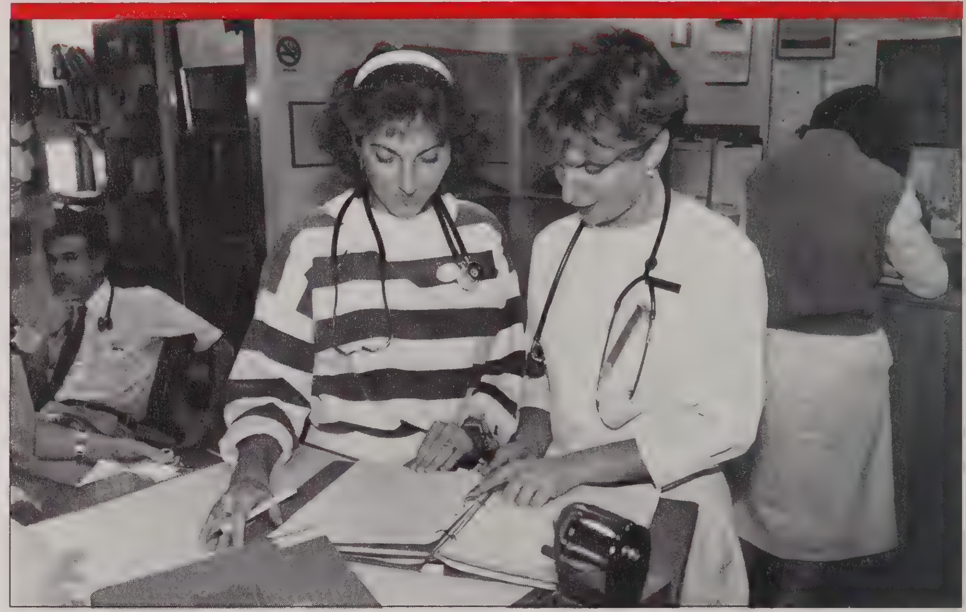
Her letter was one of five winners of a national contest sponsored by the AJN conference to find the best examples of how nurses made a difference in the outcome of a critical patient-care situation.

In addition to honors for Bethany, five other MGH staff nurses were among 14 finalists from around the country. They were Sharon Blakeney, Hope Martel, Susan Noska, Deborah Thomas, and Susan Warchal, all RNs.

In describing her struggle as Nick's primary nurse during much of his three months at the MGH, Bethany told of long talks she had with him. She learned that he acted the way he did because he felt cheated and was frightened of death.

Because of respiratory distress, including pneumonia, Nick needed oxygen to breathe, and ulcerations around his lips made eating painful.

As Nick's trust in his primary nurse grew, so did their friendship. He began to behave but at first only for Bethany. Coming on shift, she would still hear horror stories about Nick, whose weight had fallen to only 82 pounds.


Bethany Accomando Nasser, RN, left, confers with Mary Montesi, RN, about an MGH patient. Two days later, Bethany flew to Chicago to accept a top award in a national competition honoring excellence in nursing care.

With the help of a psychiatric clinical nurse specialist, Bethany and the other nurses began to evolve a plan for dealing with his demands. They enlisted the help of other hospital personnel, including secretaries and people from dietary.

A secretary, for instance, would answer Nick's call button immediately and seek his nurse. If she was busy, the secretary would ask Nick to wait 10 minutes. If his nurse could not respond in that time, she would send another nurse in her place.

To cope with Nick's constant demands for food, the nurses arranged to have his family bring in nonperishable items that he could consume whenever he desired. His weight slowly rose to 110 pounds.

Nick's threat to leave was eased by allowing him to go off the floor with an escort. Volunteers played checkers with him to help him pass the time. Nick began decorating his room, and as a hobby he started collecting stuffed animals.

Through creative nursing care, his demeanor clearly improved. At one point, he wrote on a plastic tray, "Welcome to Nick's room."

When he was well enough, Nick moved to a long-term care facility. He and Bethany kept in touch until his death last year on New Year's Eve.

"Caring and compassion are very much part of our role," said Yvonne Munn, RN, Associate General Director and Director of the Nursing Service at the MGH, "but if that was all there was then everybody could be a nurse."

Very often, she said, people think of nurses in terms of what they do with their hands, i.e., giving medications, starting IVs (intravenous deliveries), giving baths.

As part of their education, however, nurses gain a deep understanding of the human body and its psyche, and they use that science in ways that help the patient.

"Nursing," said Mrs. Munn, "is a combination of applied intellect together with caring and compassion. That's what our nurses' letters were all about."

Sixty nurses wrote letters about their patient care experiences. Of 10 entered in the AJN competition, six earned honors.

Sharon Blakeney Brackett, RN

Sharon Blakeney of Surgical Nursing in the Baker Building wrote about Lenny, a 50-year-old man who was losing a battle against cancer and was on a respirator.

Lenny's wife, Margi, accepted the

inevitability of her husband's death. More than anything, she wanted him to be at peace. In accord with his expressed wishes regarding extraordinary life-support measures, his wife and family decided to ask that the respirator be disconnected.

Margi could not bear to be in the room, but Sharon assured her that she would be there the entire time, make Lenny comfortable, and give him any messages.

"I entered the room, shut the door, and the ventilator was disconnected," Sharon related. "As Lenny took his last breaths, I held his hand and gave him Margi's messages."

After he died, Sharon went out to offer support to Margi. They hugged and wept. Sharon then led family members into Lenny's room to say a last good-bye and to see that he was now at peace.

Susan Noska, RN

Susan Noska of the Transplant Unit recounted an experience with Jeff, a 34-year-old patient who years ago underwent a life-saving bone marrow transplant and now had just received a liver transplant.

Because the first operation had left the skin discolored on his face, neck, hands, and arms, Jeff needed constant reassurance from Susan that she respected him. Even after discharge, when he made clinic visits, he would call Susan to find out if his doctors were truly satisfied with his progress.

Frequently during evenings he would call Susan with a host of concerns.

"I remembered how well Jeff responded to relaxation techniques as an inpatient," she wrote. "I practiced this with him over the phone and would monitor his response with a follow-up phone call."

By establishing this special relationship, Susan helped Jeff to rebuild his self-confidence and probably made new hospitalizations for him unnecessary.

Debbie Thomas of Medical Nursing on the Bigelow Building's sixth floor discussed a 74-year-old widower who had been living with a son but had suffered a gradual physical and mental decline.

Debbie Thomas, RN

Dismayed particularly by a loss of bladder control, Mr. B. felt he had nothing to live for. Debbie and other nurses instituted an intensive bladder training program and were able to reduce their patient's incontinence to only rare instances.

Mr. B.'s short, frequent walks to the bathroom graduated into longer walks along a corridor. But his self-esteem remained low. He was started on a mood-lifting medication which had dramatic results. He paid greater attention to his appearance and ate and socialized more.

Mr. B. later suffered a setback, a stroke that required implanting of a gastrostomy tube. He could never eat normally again. Since meals had become a high point of his day, finding a substitute became the newest nursing problem.

Mr. B. had been an avid gambler. The nurses thought he might like to buy state lottery scratch tickets in the hospital gift shop. The renewed interest, which enabled him to fantasize daily about potential good fortune, proved very therapeutic. By the time he was discharged to a nursing home, he had adjusted well.

Hope Martel, RN

A letter submitted by Hope Martel of the White Building's eighth floor Medical Nursing unit dealt with Mr. N., a 42-year-old patient admitted with lung cancer. Married and the father of a 9-year-old daughter, the patient lived on Martha's Vineyard where he worked as a plumber.

Because of the cancer, Mr. N. became confused at times and more dependent on the nurses. Despite radiation treatments, his condition steadily deteriorated.

Since everything that could be done had been tried, the nurses felt that Mr. N. should go to a hospital where he could be close to his family and friends. After much effort, a bed was found for him at Martha's Vineyard Hospital. He died less than a week after his transfer.

"For me," Hope wrote, "it was very satisfying to know that by activating a complex system to get Mr. N. back to Martha's Vineyard, I was carrying out something Mr. N. wanted most of all, to be home."

Susan Warchal, RN

Susan Warchal of Baker 8 Surgical Nursing told in her letter of Mr. A. who came to the MGH with cancer in his liver, pancreas, and small intestine. The condition had been discovered at another hospital where he went for a routine operation.

Despite surgery at the MGH for the spreading cancer, the outlook with that combination of organ cancers was bleak. His kidneys were also failing.

Mr. A. accepted his impending death, but Susan was very concerned about the patient's wife who told her that "Joe did everything for me; he was the strong one."

The day that Mr. A. died he lapsed into a coma while sitting in a chair. His wife asked that he be left in the chair because that was where he was most comfortable. She sat next to him.

"I relieved Mrs. A. when she took short walks to have a break," Susan wrote. "She was fearful that I would leave him alone when she was away. I reassured her that the other staff members were helping me watch my other patients."

Late that evening when Mr. A. died, his wife refused to accept his passing. "There are no real words that can describe the sorrow that permeated that room," Susan stated. "What could I do? No nursing text or clinical practice prepared me for this."

Susan suggested that Mrs. A. and a brother of the patient join her in prayer. In this way, the nurse wrote, "Mrs. A crossed back into this world as her husband, we believed, crossed into another."

Susan said that the experience added a new dimension to her career. "Nursing the spirit," she came to realize, "is as important as nursing the body." ■

Devising a Pesticide Harmless to Humans

FIVE YEARS AGO this month, the world experienced its worst chemical accident.

While stored in a tank at a pesticides plant in Bhopal, India, a liquid chemical, methyl isocyanate, turned into a poison gas and escaped through a pressure-relief valve. As it drifted through the area around the plant, the gas killed more than 2,500 people and caused illness to tens of thousands more.

Many pesticides used today, including those made from methyl isocyanate, kill crop-raiding insects by attacking their nervous systems, but the chemical compounds contain no mechanisms to safeguard the human nervous system.

"These insecticides are the same type of chemicals from which nerve gases were derived in World War I," said Dr. James A. Nathanson, an MGH neurologist.

Dr. Nathanson, who directs the hospital's Neuropharmacology Research Laboratory, has been trying to develop an insecticide targeted specifically at some substance active in insects and other invertebrates but not in humans. Thus, humans would be protected.

A hormone, or intercellular messenger, meeting the criteria for such an insecticide has been found. Called octopamine, it was first discovered in enormous amounts in the salivary gland of the octopus. Using a sharp tooth, the octopus would pry open the shell of a clam, for example, inject saliva containing the octopamine, and paralyze the clam.

Although similar in structure to epinephrine, produced by the adrenal glands in mammals to stimulate blood pressure and heart rate during periods of excitement, octopamine was found to be present in very low concentrations in mammals. And even when injected into vertebrate tissue, octopamine generated little activity.

Subsequent research by Dr. Nathanson identified the receptors for octopamine. Hormones are effective only if they can find a receptor on a cell to deliver the instructions they carry. Octopamine receptors were undetectable in mammalian tissue but were found in high concentrations in insect nerve cord.

This suggested that octopamine activity not only was restricted to invertebrates but that the chemical also functioned as a signal-carrying neurotransmitter. Indeed, it appears that octopamine carries out functions similar to those which epinephrine carries out in vertebrates.

The principle behind pesticides such as those made from methyl isocyanate is that if the chemical can block an enzyme which is supposed to inactivate a neurotransmitter in the central nervous system, an overdose of the transmitter will result, causing changes in mental status, confusion, and sometimes seizures.

In his research, Dr. Nathanson hoped to find a synthetic compound that would mimic the action of octopamine and cause pesticidal effects when given in excess but still be safe for humans.

Fireflies turned out to be perfect subjects for this study.

"Some work had suggested that fireflies used octopamine to control the turning on of their lanterns," Dr. Nathanson said. "Fireflies don't display a continuous light but a flashing one which signals other fireflies, often during mating."

The light organ turned out to be a tremendously rich source of receptors for octopamine, perhaps 1,000-fold greater than any other tissue.

After reading about Dr. Nathanson's work, a researcher squirted some pesticide on a firefly and found that it glowed.

"The person speculated, and we later confirmed, that the reason why the pesticide got the reaction it did was that it mimicked the action of octopamine," Dr. Nathanson said.

"The pesticide had been developed many years ago by random screening; in other words, no one really knew how the pesticide worked. But it did kill insects.

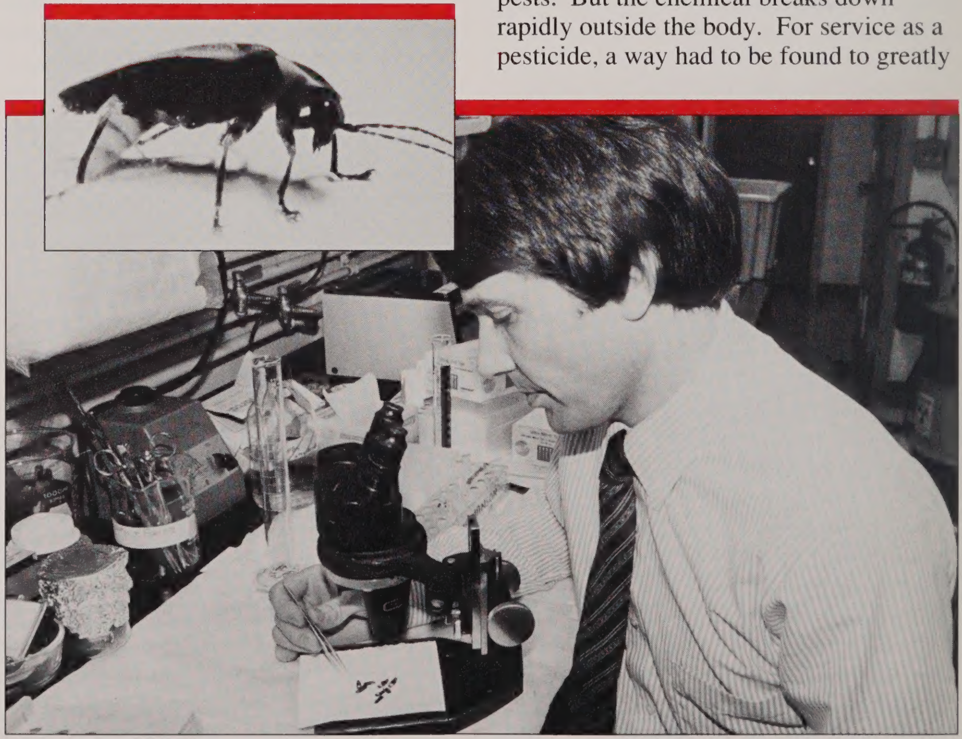
"First, it caused the insects to become uncoordinated and develop tremors. The insects would climb onto leaves, start to eat, and then fall off. After a while they would recover, climb back up, eat some more, and fall off again.

"Clearly, the pesticide was affecting the nervous system of the bugs, preventing them from eating. Eventually, because they could not eat, they died.

"This confirmed our speculation that agents which mimic the action of octopamine when given in excess can cause pesticidal effects in insects."

In his laboratory, Dr. Nathanson and his colleagues used various doses of commercially available octopamine to test their effect on hornworms, two- to three-inch-long green caterpillars which like to feed on tomato plants.

The octopamine rid the plants of the pests. But the chemical breaks down rapidly outside the body. For service as a pesticide, a way had to be found to greatly



In the Neuropharmacology Research Laboratory, Dr. James Nathanson studies fireflies whose lanterns are rich with receptors for octopamine, a hormone with potential use as an insecticide.

increase the potency of the hormone.

Dr. Nathanson has made important advances in this area. For one thing, he has shown in separate research that caffeine, the same substance found in coffee and tea, protects plants. Insects exhibited abnormal behavior after feeding on leaves sprayed with caffeine.

In his work with octopamine, supported by grants from the U.S. Department of Agriculture and the Katherine Daniels Research Fund, Dr. Nathanson found that by combining the hormone with caffeine he could achieve a much more toxic effect than he could get from either alone.

He explained that in its contact with a cell's receptor, octopamine causes the production or synthesis of a second messenger, this one inside the cell. The messenger, called cyclic AMP, activates the cell and then is broken down. Caffeine prevents this breakdown, thereby greatly magnifying the action of octopamine and increasing its toxic effects.

"We've developed octopamine compounds which are at least 100 times more potent than what we worked with originally," said the MGH neurologist.

"But our interest goes far beyond screening various compounds. We have begun to learn more about the octopamine receptor itself by using the latest techniques of molecular biology to clone the receptor gene. If we can determine the complete structure of the receptor, we can rationally design compounds to affect it." ■

Other Research

INSECTICIDE RESEARCH is just one of several areas of study by the MGH Neuropharmacology Research Laboratory.

It has also been looking for ways to penetrate what physicians describe as the blood brain barrier. Consisting of a special makeup of cells that line the walls of vessels and have their own biochemical action, the barrier prevents normally unwanted substances from entering the brain. At the same time, however, the barrier also keeps out drugs which could be important in the treatment of a number of neurological and infectious diseases.

Dr. Nathanson's laboratory also is studying how the eye secretes fluids. By learning what hormones are involved, where receptors for these hormones lie on the eye's cells, and what drugs will act on these receptors, the researchers have begun to develop improved treatments for glaucoma. This disease, resulting from a buildup of pressure within the eye, can lead to blindness if not treated.

Korean Divers Defy Winter's Cold

(Continued from Page 1)

MGH investigators to Korea and Japan to see how well humans can work underwater while holding their breath.

Accompanying Dr. Zapol were another MGH anesthetist, Dr. William Hurford, and a bioengineer in the Anesthesia Department, Kevin Stanek. They were joined by Dr. Suk Ki Hong, a noted physiologist from the State University of New York at Buffalo, and one of his engineers, John Henderson.

Dr. Zapol and his investigators focused closely on women called "ama" (sea women) whose breath-holding dives off the coast of South Korea have been acclaimed for 1,000 years.

In the early days the women occasionally searched for pearls on the ocean bottom. Today they forage instead for seafood, principally high-priced abalone, a favored delicacy of the Koreans.

By making as many as 100 dives daily to depths of 25 to 30 feet to obtain the shellfish from the ocean bottom, the women garner a lucrative income.

Wearing wet suits and face masks but no breathing-assist equipment, several thousand South Korean women spend three to six hours a day diving off their country's shores into the Sea of Japan.

Why are women preferred as divers? While men are stronger, the physical makeup of women is better suited for the cold to which the divers must often subject themselves. Korean women dive even in winter when the water temperature falls to as low as 50 degrees Fahrenheit.

Each dive lasts only about a minute, which might cause one to ask what is so special about these Korean ama. Sitting in a chair, it is possible to hold one's breath for as long as three or four minutes.

Dr. Zapol explained that "when these women exercise as hard as they do to descend and work on the ocean floor, sometimes up to 60 feet down, they probably burn more than triple the oxygen that is normally consumed per minute while resting at the surface."

So difficult is the work that when a Korean diver surfaces, her skin often briefly appears bluish (cyanotic) from lack of oxygen, and a woozy sensation may set in for about 10 seconds.

"It's a temporary feeling similar to how a Bostonian might initially be affected on a visit to mile-high Denver, Colorado, where the air is thinner," Dr. Zapol said.

"The dizziness ends quickly. It takes the women only a minute to reoxygenate,

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These Korean women may dive as many as 100 times a day without the assist of air tanks.

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Korean Divers

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blow off carbon dioxide, and be ready to submerge again."

During a study of young Japanese male scuba divers on the southern edge of Tokyo Bay, Dr. Zapol tried to compare their talents with those of the Korean ama, but he said the men "just couldn't perform the vigorous diving activities that the Korean women did."

The Antarctic seal studies led to an interesting physiologic finding about the Korean ama. *Having trained for diving since as early as the age of 10, these women appear to have developed a special protection.* It involves their spleen, an abdominal organ which stores oxygen-carrying red blood cells and also filters worn-out red cells from the blood.

When seals dive, their spleen contracts, injecting additional red cells into their bloodstream. Their hematocrit, the percentage of a drop of blood composed of red cells, rises by about 50 percent.

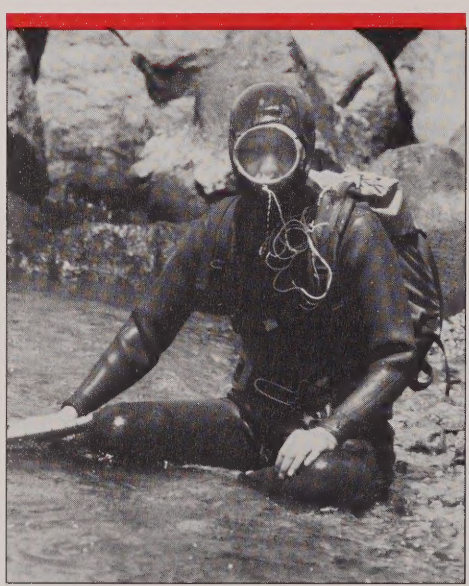
In studying the Korean divers, Dr. Hurford used ultrasound to evaluate the spleen size of these swimmers both before and after three-hour periods of diving. He learned that their spleens also contracted and increased the hematocrit in their blood by 10 to 15 percent.

"We would never have guessed the changes in the human spleen if we hadn't seen such changes in the seal," said Dr. Zapol. "The divers did not have a bigger spleen than normal Korean ladies, but the spleen did contract. Whether this was a response to exercise or to hypoxia, we don't know. Also we don't yet know whether the spleen contracts and ejects red cells on each and every dive."

The MGH team carried special equipment to Korea to study oxygen saturation and heart rate among the ama. The Massachusetts Humane Society provided the study grant in memory of New England sailors who had drowned in shipwrecks.

Dr. Zapol's bioengineer, Mr. Stanek, had collaborated before the trip with the Wisconsin-based CSI Corporation to modify a device called a pulse oximeter. Used in virtually every hospital operating room, the machine shoots a light through a finger and records how red the light is when it comes out the other side. From that, one can determine levels of oxygenation, the adequacy of oxygen reaching tissue, and heart rate.

Since the swimmers' fingers could not be studied because underwater they would turn cold, become pale, and their vessels would constrict, Mr. Stanek fashioned a special oxygen sensor and receiver that could be built into the face mask of each ama diver.



Sensitive equipment to assess the diver's oxygen saturation and heart rate is worn in a waterproof backpack and connected by wires to the diver's nose.

By shining a light through the tissue of the septum, or wall, separating the nostrils, the sensor could obtain the data that the investigators needed. As a backup test to assess heart rate, the investigators attached wires to the swimmers to obtain an EKG (electrocardiogram) during their underwater work. The swimmers carried all of the recording equipment in waterproof backpacks made at the MGH by Mr. Iain Wright and coworkers in the Biomedical Engineering Department.

Through Kosin Medical College at Pusan, South Korea, the MGH and Buffalo specialists were able to arrange a collaboration with a marine biological laboratory situated on a peninsula five miles from Pusan where a rocky beach provided a perfect setting for their studies.

Dr. Zapol said the Korean ama take excellent care of themselves. They probably have slightly larger lung capacities than normal, and they do not smoke. But South Korea's diving population will not get any younger.

"The mean age of the women I studied was about 45," Dr. Zapol said. "The rapid industrialization of Korea and Japan has reduced the attractiveness of an outdoor profession that calls for diving in December when the wind is blowing and the water is frigid. The young people prefer to work in a warm automobile plant."

The women divers union in Korea is extremely powerful, however, and refuses to let the fishing industry employ professional scuba divers. With air tanks that would allow them to work underwater for an hour or more, the scuba divers would quickly clean out the Korean coastal beds.

Emphasizing that this year's work was a pilot study, Dr. Zapol said he plans to return to South Korea next summer to study women stone divers (funado).

These women dive with a heavy stone to reach the bottom faster. By not having to swim down, they conserve oxygen and can dive deeper to collect larger abalone. When the diver is ready, she pulls on a rope tied around her body and her husband hauls her to the surface from a boat.

"Studying funado divers will allow us to learn the ways that humans conserve oxygen underwater," Dr. Zapol said. "And we hope to learn when an ascending diver becomes low on blood oxygen, while still submerged or after reaching the surface."

As Dr. Zapol put it: "So far in our work, we've just scratched the surface." ■